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H. C. PARMELEE, Editor

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The Necessity Of Background

"OH YES, I remember chemistry—H_2SO_4!"

One of the greatest difficulties in the way of understanding a new subject is the absence of background on the part of the student. The pressure of the curriculum usually prevents the instructor from developing the background adequately before plunging into the detail of vocabulary that underlies the subject. In addition the instructor usually fails to appreciate the completeness of this lack in the average student. Chemistry is a peculiarly difficult subject in this regard, for the student approaches it with no background and the field is entirely new in method, thought and vocabulary. Is it any wonder that a vast majority of those who studied chemistry remember only the mystic symbols H_2SO_4?

So it was with great interest that we read a new book in the field of economics called "The Background of Economics," by Professors M. H. Hunter and G. S. Watkins of the University of Illinois. It was designed to bridge the gap between the high school courses in social science and the college courses in the principles of economics, because the authors believe that "there is an urgent need to develop in the student the point of view that economics deals with the world in which he lives."

What a field there is for just such a book on chemistry—a book that will make the student understand that he is about to study the problems of living and of civilization from a new point of view! Such a book would remove for the student that confusion which the apparently meaningless jargon and its seemingly preponderant importance have built up in his mind. We should then have fewer people whose only memory of chemistry is a few disagreeable odors and a few mystic symbols. Speed the day!

Mr. Ford and Low-Temperature Carbonization

THERE have been all sorts of comment on Mr. Ford's support of the Piron-Caracristi low-temperature carbonization process. Some of the newspapers would have us believe that Mr. Ford is now taking steps to double the energy available from a pound of coal, for does he not clearly announce that he proposes to "burn coal twice"? Other more technical comment is somewhat skeptical as to the possibilities of achievement; although some equally distinguished technologists are altogether eulogistic of the "flivver" manufacturer.

The facts of the situation clearly demand a word of commendation and approval for this research, though they do not justify that undue optimism which is so characteristic of some of the daily press statements. We need just such large financial support for the researches of low-temperature carbonization as Mr. Ford is in a position to give. Low-temperature carbonization and the utilization of semi-coke is far from that stage at which it can command general financial backing. Any one going into this work must stand ready to lose thousands, if not millions, before he can begin to profit financially from his investigations and investments. It is particularly fortunate, therefore, that a man of large means who is accustomed to ride his hobbies hard should be willing to go in at this time.

The process Mr. Ford is investigating is one in which the finely crushed coal is carbonized by heating on the surface of a molten lead bath. This process promises very high efficiency in heat transfer from the heating medium to the coal, but the mechanical engineering problems are tremendously complicated. And there will remain, too, a question of the market value of the products, for as yet no one has clearly demonstrated just what low-temperature tars and oils are really worth in quantity.

Support Is Needed For a Worthy Cause

A RESOLUTION adopted on Oct. 3 by the National Research Council reads, in part, as follows:

Whereas an accurate knowledge of thermal effects connected with chemical processes is of the highest importance to the chemical and metallurgical industries, and

Whereas there does not exist in this country at the present time any bureau, laboratory or other organization devoted to investigation in this field: therefore be it

RESOLVED, That the National Research Council, acting upon the recommendation of the Division of Chemistry and Chemical Technology, direct the Secretary to bring this matter to the attention of the Director of the Bureau of Standards, and urge him to create within the Bureau of Standards a laboratory which shall be devoted primarily to research in this field.

It is perhaps unnecessary to remark that this resolution strikes a keynote of great importance to our industries. It is understood that, fortunately, the Bureau of Standards listens with complete sympathy to these proposals. In fact, for a number of years the bureau has been considering the means by which an extension of its research into both thermal chemistry and thermal physics might be accomplished. Obviously the first step is to secure the money for planning and executing the fundamental research work needed.

In a pre-election Congress funds are gained with difficulty, but from time to time new allotments are made when it is clearly demonstrated to the satisfaction

of the legislators that real service can be expected from the money and that there is a wide and sincere interest in having the work done.

This is one of the cases that will command support of science and industry generally, but this support is likely to be needed if results are to be gained with Congress. It is impossible at this moment to state officially in just what form the bureau may request such funds, as the rules of the Budget Bureau prevent announcements until the budget requests have been submitted to Congress during the first week in December. But there can be no doubt that the bureau must make some such request, and there is still less doubt as to the need for vigorously supporting the director of the bureau when he appears before the Congressional committees. There is not a branch of chemical or metallurgical industry that will not profit by such fundamental studies. It will be well if many of our readers will add their word of support to this resolution of the National Research Council, so that the recommendations of Dr. Burgess to Congress will be able to overwhelm any opposition or false ideas of economy.

Urgent Problems in Forest Conservation

WHEN the new Congress meets in December it is certain to be confronted by an insistent demand for establishing a permanent forestry policy. A committee from the Senate, under the chairmanship of Senator McNary of Oregon, has made an exhaustive investigation and is prepared to report on practically every phase of our forestry problem. The wood-users, more particularly the pulp and paper industries, have just emerged from a trying period in which a long strike in the Swedish pulp mills and a threatened embargo of pulpwood from Canada have combined to set forth in bold relief our increasing dependence on foreign sources. And finally there is the sane, logical appeal for conservation and reforestation voiced by the officers of the Department of Agriculture and the United States Forest Service.

Here are some of the startling facts of the situation, as Secretary Wallace outlined them in his testimony. "The original forested area, estimated at 822,000,000 acres, has now been reduced to about 469,000,000 acres, of which 138,000,000 acres are in virgin forest, 250,000,000 acres contain culled and second-growth stumpage amounting all told to about 42 per cent of the original estimated stands. The yearly drain in sawtimber and other high-grade products is six times the rate of replacement." Secretary Wallace adds by way of support to the plea for a national reforestation policy: "If the present forest area can be made to produce wood steadily as in Europe, a yearly crop of between 25,000,000,000 and 30,000,000,000 cubic feet would undoubtedly be obtained, or roughly 20 per cent more than the present consumption."

The pulp and paper industries, in contrast to the lumber interests, have been inclined to support reforestation, although, as Hugh P. Baker pointed out in his testimony before the Senate committee, drastic changes must be made in our basis of taxation before the project can be regarded as commercially practicable. This is a knotty problem for the government, since it involves the conflict of federal and state jurisdiction. Protection against fire and the ravages of plant and insect pests is imperative, and its importance is not likely to be overestimated. Yet in some quarters there is determined opposition to increasing the appropriations for this essential service and an inclination to imply that this would involve an unwarranted extension of governmental meddling in private affairs.

Another factor that figures into every discussion of our forestry problem is Alaska with its great unexploited natural resources. We have ourselves been guilty of repeating current rumors regarding the government's attitude toward the development of these resources and we are glad, therefore, to be able to publish, on page 763 of this issue, a letter from Acting Forester E. A. Sherman, which clearly sets forth the Alaskan opportunities for the pulp and paper industries.

These are but a few of the high spots in a situation that is of paramount importance, not alone to the wood-consuming industries but to all who are concerned with our national welfare. The problem must be met by intensive, co-ordinated work on conservation and reforestation, by new and more efficient methods of wood utilization, by the development of substitute materials and improved fabrication processes. Yet underlying all of this program is the necessity for establishing a permanent policy as a basis for legislation that will permit us to practice intelligently the science of forestry in its broadest sense.

Foreign Chemical Societies In America

AT THE annual meeting of the Société de Chimie Industrielle we were reminded of a suggestion we hear repeated occasionally that these foreign societies should not be encouraged; that neither England nor France nor other European nations invite the American Chemical Society to establish branches there; and that there is no reason why they should; by which token we should not ask their societies to come over here, either. All these foreign organizations, say the complainants, eat into the pastures of the American Chemical Society, and they should be abandoned and sent home.

We do not agree with the notion at all. In the first place, competition is good for the great American society. Nearly all the members of the foreign bodies are also members of it. Their meetings provide for the presentation of papers that otherwise would not be prepared. The variety of officers brings to the light the work of men that otherwise might not be approached. In New York City, for instance, nearly every Friday evening during the season is taken up for a chemical meeting in Rumford Hall. Besides the American Chemical Society, there are the native Electrochemical Society and the Institute of Chemical Engineers, and in addition we have the British Society of Chemical Industry and the French society above mentioned. Why should we not welcome them? We are not jealous, we want to know what is going on and we want to read their journals. The best way to get the journals is to belong to the respective societies. If chemistry in America is so important that they desire to have branches here, so much the better for chemistry in America. The American sections do not become foreign. The council of the French society, for instance, which includes among its members Professors Chandler, McKee, Bogart, D. D. Jackson, Drs. Herty, Kunz, Nichols and others,

does not lapse into French when it convenes. It might even meet hindrances of expression were it to do so. If French were the official language of the council meetings, these meetings would resolve themselves into triologues among Professors Baekeland, Thomas and Zanetti.

Dr. Allen Rogers has been for many years secretary of the Society of Chemical Industry, and yet even this experience has not induced him to broaden his a's, to wear a silk hat to meetings or to decorate his speech with Briticisms. Prof. Ralph H. McKee was chairman of the New York Section of the American Chemical Society, is now chairman of the American Section of the Society of Chemical Industry, and is a member of the council of the French society. This multiplicity of societies, native and foreign, thus provides not only for more frequent meetings and more chemical information, for approach to men of research because of a larger number of officers to dig them up, but also for the larger availability of productive men.

A Better Approach To the Coal Problem

AGAIN the United Mine Workers and the National Coal Association are indulging in a mud-slinging contest. The subject at the moment happens to be the relation of communism to the Herrin coal-field massacre. There is little point in considering what is the subject of this particular controversy. The more fundamental and important question is, Why should mine owners and mine workers be continuously in controversy instead of occasionally devoting some of their brains and energies in a collective fashion to the improvement of economic and industrial conditions affecting both owner and worker?

There are wide differences in efficiency between mines located under similar conditions in the United States. There are wide differences in working conditions with respect to both comfort and safety. Why is it that differences of this sort are not the subject of joint investigation by the mine workers' organizations and the organizations of coal operators in the various districts? By even a small measure of co-operative study of technical and economic questions enough real benefit to both parties would be achieved to justify the expense and effort involved.

And more than anything else that might be hoped for from such co-operative studies would be a mutual understanding of each other's problems and interests. From such mutual understanding would grow up mutual confidence and respect. If such a basis of understanding and real confidence in the other party could be developed, the bituminous coal industry would make such progress as is wholly unlooked for under the present system of continuous strife and controversy.

Protection That Does Not Protect

NO, OUR reference is not to the tariff, for after all there are other forms of the protective delusion. We recall a conversation recently at the steel show in Pittsburgh in which a metallurgical friend of ours asked a famous corrosion expert for advice on one of his plant problems. The expert recommended a corrosion-resisting alloy for the purpose in question, but in making his recommendation he stated most emphatically that for best results the metal must be left openly exposed to the corrosive agent—i.e., unprotected in any way. He pointed out that any protective sleeve or even the passage through a wall or support might prove disastrous. The reason for this is that a closed space would be provided in which the corrosive liquid might be permitted to concentrate or, in case the agent is gaseous, to form an aqueous solution that would result in unnecessarily severe local action.

This well-seasoned advice had a direct bread-and-butter value to our friend, but to us it seemed to explain why many new alloys that have resisted corrosion in laboratory tests fail miserably in industrial application. After the specimen has withstood the severest laboratory tests, the installation in the plant is partly "protected" in the hope of strengthening the part or increasing its life. Unfortunately the results obtained are often just the opposite of those desired. Open exposure would have been the more gentle treatment, for what was apparently protection in reality merely accelerated the corrosion.

Metal-Vapor Poisoning

AS A general thing engineers as well as chemists clearly recognize the fact that mercury vapor and other metal vapors are dangerously poisonous. Unfortunately this fact is too often regarded as one of academic significance, not one that requires careful consideration in the laboratory as well as in the plant. As a consequence from time to time there are highly unfortunate cases of preventable metal poisoning.

Lately in one of the largest scientific research institutions of the country there was an example of this sort of accident, but under such peculiar conditions that one is not at all disposed to criticise those planning or executing the work. Fortunately the men subjected to mercury-vapor poisoning were cared for promptly in this case; but the example is none the less a warning to all that even small quantities of metals at high temperature may become a source of hazard under laboratory conditions as well as under plant conditions.

In this particular case the manufacturer of the equipment responsible for the poisoning has taken a highly commendable stand in the matter. He is arranging that every purchaser of the equipment be notified of the potential danger when the apparatus is used under conditions for which it was not designed but to which it might easily be changed by any user. Moreover, he is offering to supply at a nominal fee slightly modified equipment that is entirely safe; this will make it wholly unnecessary that even remote chance for danger remain in the unusual applications of the apparatus.

It will be well that users of other types of equipment in which mercury may become heated and give off minute quantities of vapor shall also consider how this can be prevented. Where production of metal vapors may exist even remotely as a possibility, it should be determined whether adequate ventilation is provided to insure removal of the vapor in case it should be generated. Carelessness in cases of this sort may, 99 times out of 100, produce no serious results; but at that, the lack of full precautions is not justified in any case.

Superpower and Economic Statesmanship

Another Step in the Accomplishment of a Great Economic Goal Has Been Taken Under the Leadership of Herbert Hoover

MOST of us are frequently made conscious of the unwieldy intricacy of modern civilization. A little snowstorm, and the shortage of food in our large cities becomes acute! A group of workers becomes dissatisfied, and our houses go unheated or we are forced to walk to work or to pay exorbitant prices for a conveyance. In such a sensitive organism as this it is becoming increasingly necessary that a type of economic statesmanship be developed as will anticipate crises and so arrange conditions that the crises shall not come into being.

Of such a nature is the economic statesmanship of Herbert Hoover, and the most immediate example of it is his fostering of the superpower area idea. This northeastern section contains a most varied industrial effort. It consumes a prodigious quantity of power and is more likely by reason of its concentration to run into local shortages that border on famine and local satiety that means waste. That is inevitable, and power is not a commodity that can be stored. Once generated, it must be consumed immediately.

Secretary Hoover's statement pointed out that modern engineering had brought to realization a much cheaper power. To some extent this is due to efficient operation of the generating plant, but to an equally great extent to the ability to transport high voltage current for long distances without loss. This will make possible hydro-electric developments considered out of the question in the past because of their remoteness from industrial centers. It also presages the construction of tremendous power stations generating electricity from coal. But to utilize power economically it is essential that no artificial boundaries of state or territory be imposed. Interconnection of power lines must be complete, if the most effective and economical development of electric service to industry and the public is to be accomplished. He then called on Mr. Murray of the Federal Superpower Survey of 1918

Herbert Hoover

to give some statistics as to the saving to be accomplished. In 1930, 31,000,000,000 kw.-hr. will be needed in the northeast area. The most economical method of accomplishing this result is the interconnection of present stations and the construction as need requires of huge economical power stations to feed the network. Estimated savings amount to about $230,000,000 per year to the utilities, $84,000,000 to the railroads and $180,000,000 to the industries.

It is interesting that the superpower idea is an accomplished fact on the Pacific Coast and that in the Middle West Wisconsin, Illinois, Michigan and Indiana are already working under such a pact. Why then, should this section of the country (the northeast section) be so slow in taking up this idea?

Mr. Buckland, legal adviser to the commission, discussed the legislative aspects of the problem and pointed out that permissive legislation was all that was necessary. Mandatory laws by state legislatures or Congress were highly undesirable, particularly the latter, as the problem must be kept out of politics.

Mr. Buckland recommends the formulating of uniform legislation, such as the uniform negotiable securities act now in force in many states, so that the states will arrange of their own volition by adopting it that superpower can be regulated, financed, purchased and transmitted. Thus each state will do its part in the general ecnomic development.

Each commissioner then presented his own views and in general heartily indorsed the idea. The difficulties in the way of carrying out the idea were enumerated merely in the spirit of taking stock and not of pessimism, for the general tone of the responses was hearty and optimistic. Many interesting points were developed, one being the reasons back of the attitude of the state of Maine in prohibiting the exportation of power. The origin of it was the protest of the agrarian voters against the loss of the last great natural resource, forests having fallen into private control early in the history of the state.

There is inhibition on the part of the citizen, who cannot get away from the conception of power as a commodity to be stored and husbanded. There is inhibition from the utilities, which are afraid of jeopardizing their initial investment. But these inhibitions are far from insurmountable and the whole tone of the conference was one of optimism not only as to the ultimate success of the idea but to its early fruition.

There is a responsibility on each one of us in so far as this idea is concerned. To translate the idea into accomplished fact means that engineers, executives and investors must study the related problems. Then when a power development is contemplated they can act intelligently to encourage it as a part of this program or to see that it is properly organized as a part of the program. Will you do your share?

Quantity Methods in

Production of Quality Metals and Alloys

In Its New Plant at Huntington, W. Va., the International Nickel Co. Applies the Methods of the Steel Plant to Production of Malleable Nickel and Monel Metal

BY R. S. MCBRIDE
Assistant Editor, *Chem. & Met.*

CHEMICAL ENGINEERING IN INDUSTRY

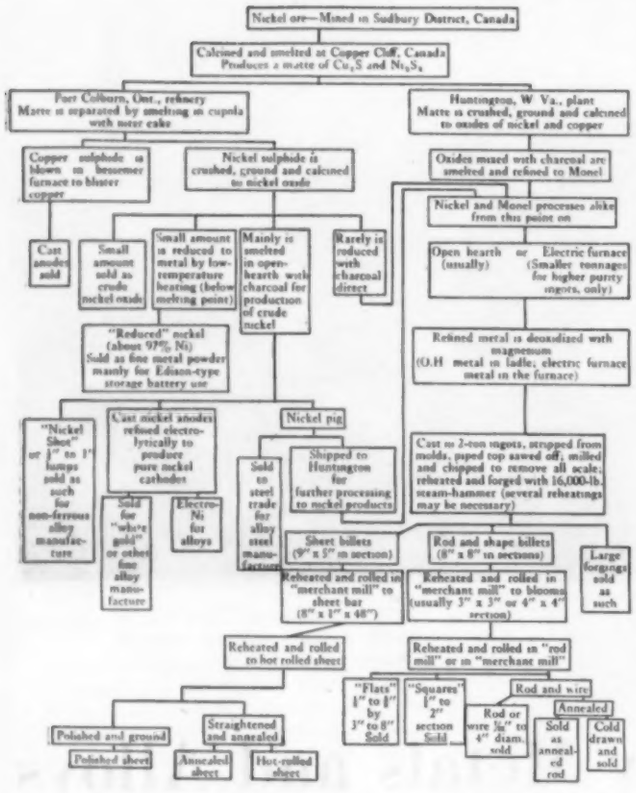
THE metal user wants quality to be the first consideration in the preparation of a metal which he uses; and it is not enough that the average quality shall be up to standard specified; the quality must be uniform through each lot and from one delivery to another. Of course the price, too, must be right and deliveries must be prompt and in accordance with promises. That the international Nickel Co. recognizes these facts is evident to any visitor at its new plant in Huntington, W. Va. This plant is, in fact, concrete evidence that this concern is undertaking to meet quality as well as price and delivery requirements through a complete integration of its industry and the best control of the production and fabricating processes by operation of its own plants.

At Huntington the company makes malleable nickel and Monel metal, in rod, sheet, flats, squares and hexagons of all ordinary dimensions. This work is conducted on a larger scale than has hitherto been possible, partly in response to increasing demand for these metals, but more particularly because the company now controls its own rolling mill and for the first time, therefore, can take full responsibility for every detail of operation, from the ore to the finished rod, sheet or shape.

The plant at Huntington is, of course, of wide interest to metallurgists; but the present or prospective user of malleable nickel and nickel alloys has quite as much interest in it. Furthermore, the plant affords a considerable number of interesting chemical engineering achievements that may find application outside the field of metallurgy, as well as in other non-ferrous or ferrous metallurgy.

The plant at Huntington is essentially a refinery and rolling mill, which takes the matte of copper and nickel sulphide or the crude-nickel pig and makes finished metal and alloys in rod, sheet and shapes. It was erected because the company found it far from satisfactory to depend exclusively on the custom rolling of its products in steel mills, as was formerly done. The relationship of this plant to the other branches of a complete nickel enterprise are shown clearly by the general flow sheet of the International Nickel Co. (see figure). That sheet makes clear the relationship of the Huntington work to the mining of ore in the Sudbury district of Canada, the primary smelting at Copper Cliff and the refining or production of certain nickel products at Port Colborne, Ont.

As will be more clearly evident from some of the discussion that follows, this Huntington plant, though working exclusively on non-ferrous metals, much more strikingly resembles a steel mill than an ordinary non-ferrous metal plant. The metals handled are of high melting point and require heavy rolling, forging and drawing equipment; in fact, most of the metallurgical



FLOW SHEET OF THE NICKEL INDUSTRY
(INTERNATIONAL NICKEL CO.)

apparatus at Huntington is a direct adaptation of steel mill machinery. Where there is a difference, it is quite as likely to be in the nature of an increase in size or strength as a decrease.

Factors Determining Plant Location

Before the company perfected its plans for this refinery and rolling mill, a committee of the company made a thorough study of a large number of locations in the industrial district from the Great Lakes southward as far as Tennessee. A great number of economic factors were then investigated to determine in detail the relative suitability of those locations which on preliminary investigation promised to be most satisfactory. Table I gives the facts developed, as presented recently in an article by W. L. Wotherspoon, showing not only the factors considered but also the relative weight given to each. It will be seen from this table that availability of fuel, labor and power were three of the principal considerations, as may well be the case in the selection of a site for most industrial projects.

The availability in the neighborhood of Huntington of English-speaking Americans who have a good reputation in the diversified industries of that territory was an important factor in favor of this location. Because a majority of these workers are accustomed to own their homes and demand good living conditions, the labor turnover in such a plant can be expected to be small. Experience of the company thus far indicates that this is not an unreasonable expectation.

A plentiful supply of natural gas and the certainty of indefinite supplies of good quality low-sulphur bituminous coal, to replace gas and oil when this necessity arises, insure low fuel costs for the industry. The present and prospective future power development at hydro-electric stations also was strongly in favor of this location.

The nickel ores of the Sudbury district in Canada after calcination in a roasting furnace and treatment in a blast furnace give a matte which is essentially copper sulphide (Cu_2S) and nickel sulphide (Ni_2S_2), with about 1 per cent of iron sulphide, but containing substantially no carbon, manganese or silicon and only traces of other metals. The further refining of this matte by simple direct methods gives a natural alloy of copper and nickel which is the Monel metal of commerce.

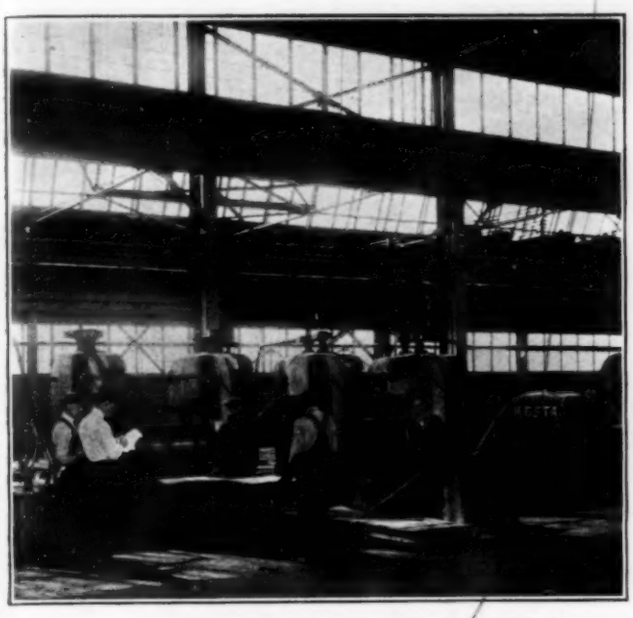
At the Huntington plant the raw material for the process is the matte prepared at the Copper Cliff, Ont., plant of the company. The composition of this matte is approximately 56 per cent nickel, 24 per cent copper, 20 per cent sulphur, with an iron content generally under 0.4 per cent, and all of that which is shipped to the Huntington plant for refining contains nickel and copper in the ratio 2.4 to 1.

The matte is received in chunk form by box car. Deliveries can be run directly to the doorway of the calcining building, where the chunks are shoveled or discharged from the car by hand down a chute leading to a jaw crusher, which breaks them to approximately egg size. A bucket conveyor elevates the crushed matte to the hoppers feeding a group of ball mills, in which the material is ground so that practically all passes a 16-mesh sieve. This fine sulphide is then elevated to the hoppers above the roasting furnaces, into which it is fed continuously.

The crusher and ball mill capacity is ample, about 45 tons of matte per 8-hour shift, so that this equipment can be operated intermittently at a rate corre-

TABLE I—FACTORS DETERMINING PLANT LOCATION

Factor	Relative Weight, Units	Other Desiderata	Type	
Labor	250	Skilled	Supply	
		Common	Rates	
			Strikes	
Fuels (Metallurgical power generation)	330	Cost and quality	Oil	
			Producer gas	
			Natural gas	
			Coal	
			Coke	
Power	100	Public service electric supply		Costs Service
Living conditions	100	Housing		
		Cost of living		
		Sanitation and health		
Climate	50	Minimum and maximum average temperatures		
		Average snowfall		
		Average rainfall		
Supplies	60	Sources and costs of supplies	Matte	
			Refractories	
			Rolls, castings and mill spares	
			Sheet bars	
			Charcoal	
			Electrodes	
			Chemical and metallurgical — miscellaneous supplies	
			Lubricating oils	
			General stores	
Transportation (Railroads and water)	50	Products, distribution of	Monel and nickel shot	Domestic Export
			Pig, sheet, rod, wire rod, forging	
Water supply	10	Service costs		
		Quality		
Taxes and laws	20	State		
		Local		
Selection of site	10	Railroad connections		
		Character of ground for building and equipment foundations		
		Drainage and flood conditions		
		Accessibility for labor		
		Grading and facilities for slag disposal		
		Provision for expansion of works		
Construction costs	20	Labor		
		Material		
		Supplies		



COLD MILLING SHEETS

sponding to the receipt of cars of raw material, without causing any difficulty due to intermittency of roaster operation. The capacity of each of the natural gas-fired roasting furnaces, of which there are three, is approximately 12 tons per 24 hours; the temperature of roasting varies from about 500 deg. F. at the inlet to 2,000 deg. F. at the discharge end of the furnace.

Sulphide entering at the cool end of the furnace is spread in a uniform layer over the bottom by rabbles, which also advance it somewhat on each turn. As the matte progresses toward the burner end (hot end) of the furnace, it is stirred and moved by other rabbles, which consist of water-cooled arms carrying small plow teeth which barely clear the refractory bottom of the furnace. By this process the sulphide is almost completely converted to oxide, the percentage of the sulphur in the oxide being usually not greater than 0.005 per cent. The oxide from the discharge is ready for mixing with charcoal and smelting in either open-hearth or electric furnaces for direct production of metal.

The charcoal that is used for reducing the oxide is procured locally as irregular size material. After passing over the magnetic pulley to take out tramp iron, it is crushed to about half-inch size before mixing with the oxide at the discharge of the roasting furnaces. It is interesting to note that the danger of spontaneous combustion of the charcoal, both in crude form and after crushing, is recognized by the use of small fireproof bin construction and by operation so as to store only small quantities of the crushed charcoal which is most likely to be ignited spontaneously.

An Advance in Refining Practice

The Huntington plant is now equipped with two open-hearth furnaces, which customarily are operated with 20-ton charges, and two electric furnaces, one of the Heroult type of 8-ton capacity and one of the Moore type of approximately 4-ton capacity per charge. The open-hearth furnaces are fired by either natural gas or oil and are operated on a cycle of about 20 hours per charge. The oxide from calciners mixed with charcoal is stored in hoppers mounted above the open-hearth furnaces; but the oxide and charcoal for the electric furnaces are charged separately by shoveling from the operating floor.

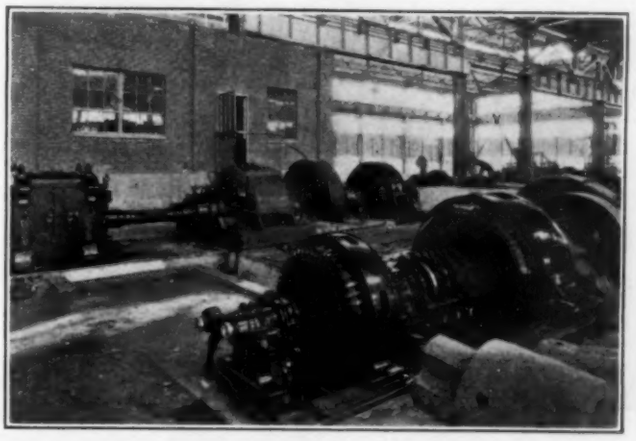
The open-hearth furnaces are lined with high-grade silica refractory carefully selected for its low iron content, to avoid iron contamination of the metal, and for resistance to temperatures up to 2,900 to 3,000 deg. in the metal bath. The electric furnaces are lined with basic refractory and are operated with a basic slag to facilitate sulphur removal and production of a high-quality product, as indicated later in this article under the discussion of metallurgical plant control.

As both Monel metal and nickel are of high melting point, the furnace operation demands close temperature control in order to insure good furnace operation with a minimum of damage to refractories. In general the tapping temperature is from 2,850 to 2,900 deg. F. and the pouring temperature from 2,650 to 2,800 deg. The heat losses in a furnace operating at these high temperatures would be exceedingly great with direct discharge of the products of combustion to the stack. Each of the open hearths in this plant is, therefore, directly connected with a 600-hp. waste-heat boiler and superheater. The steam from these boilers is used in an auxiliary power house immediately adjoining, where two 750-kw. turbo alternators are installed; or, when desired, the steam may be used for operating the steam hammers in the forge shop.

The refinery department at the Huntington plant is regarded as a great advance over the practice attained previously in handling nickel or Monel metal. It has proved entirely satisfactory to process the calcined matte in a single operation directly in an electric furnace or in the open hearths for the production of an ingot which after chipping is ready for forging and rolling without further refining. This represents a very great saving, because with a metal of extremely high melting point the heat losses due to every heating and cooling operation are great. The reduction of the refining operations to a single furnace treatment permits, therefore, a big thermal economy.

Economical Furnace Operation

In the production of Monel metal and nickel for all ordinary purposes, the oxide is usually reduced in the open hearths. Where exceptional purity is desired, particularly for the highest grades of nickel, the oxide is handled in the electric furnace, where the basic bottom and basic slag permit a sulphur reduction not possible in an acid furnace. The operators of this



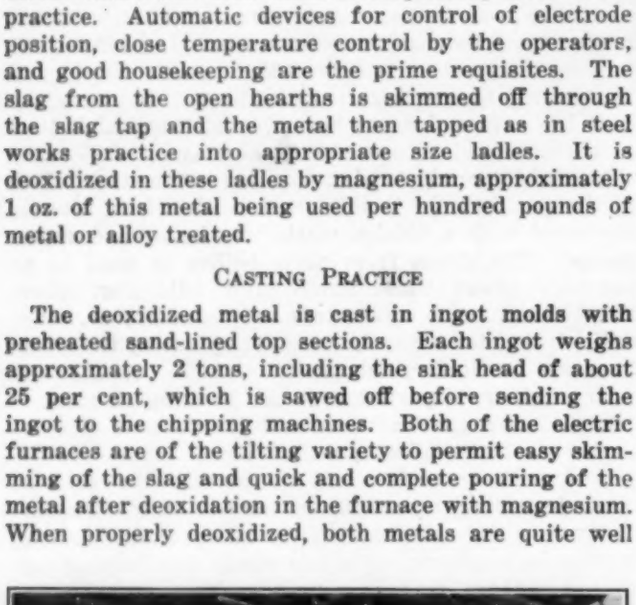
ELECTRIC DRIVE FOR 14 AND 10 IN. MERCHANT MILLS

plant are particularly proud of results they are regularly obtaining in these electric furnaces, for it is one of the very few cases where direct oxide reduction with charcoal has been accomplished in such a single processing operation by any industry. When one realizes that successful forging and rolling require absolute control of sulphur, manganese, iron and carbon, it can well be understood why regular and successful operation of these electric furnaces with a small percentage return of rejected metal from the hammer and rolling departments is a matter for congratulation of the firm's operators.

The operation of the open-hearth and electric furnaces differs but little from corresponding steel works practice. Automatic devices for control of electrode position, close temperature control by the operators, and good housekeeping are the prime requisites. The slag from the open hearths is skimmed off through the slag tap and the metal then tapped as in steel works practice into appropriate size ladles. It is deoxidized in these ladles by magnesium, approximately 1 oz. of this metal being used per hundred pounds of metal or alloy treated.

Casting Practice

The deoxidized metal is cast in ingot molds with preheated sand-lined top sections. Each ingot weighs approximately 2 tons, including the sink head of about 25 per cent, which is sawed off before sending the ingot to the chipping machines. Both of the electric furnaces are of the tilting variety to permit easy skimming of the slag and quick and complete pouring of the metal after deoxidation in the furnace with magnesium. When properly deoxidized, both metals are quite well behaved, but before deoxidation they boil and spatter so as to preclude safe and careful handling.



BROSIUS CHARGER TAKING BILLET FROM FURNACE TO 24-IN. BAR MILL

CHARGING THE SHEET ANNEALING FURNACE

Ingots are poured from ladles of electric-furnace metal exactly as with metal from the open hearths. Care is taken to pour the ingots very slowly during the first half minute—that is, until the base of the ingot mold is filled, after which 2 tons of metal is poured in approximately a minute and a half, and then an equal length of time is taken for the very slow filling of the top section. This is essential in order that ample hot metal may be kept in the top to feed down into the center of the ingot and prevent an extension of the piping below the lower line of the top section of the ingot mold. With the usual 8-ton charge from the larger electric furnace, it, therefore, requires from 10 to 12 minutes to pour the four ingots. Because of the high temperature required during tapping and pouring, about 2,900 deg. F. for the former and about 2,750 deg. for the latter operation, ladles are always preheated by natural gas for at least an hour before filling. Even with this precaution, the metal loses at least a hundred degrees and sometimes nearly double this amount from furnace temperature to pouring temperature by the time the last of the four ingots is cast.

At the Huntington plant the raw material for all malleable nickel operations is pig received from the Port Colborne refinery. This pig nickel is remelted, generally in the electric furnaces, and after proper refining for sulphur reduction by means of a basic carbide slag, is cast in nickel ingots. In general a single slag is sufficient for reduction of the sulphur in pig nickel from 0.04 to 0.025. But when a lower sulphur percentage is required, a second or even third slag is sometimes used. The slag is made by shoveling onto the molten metal formed from the pig a mixture of lime, fluorspar and charcoal in proper proportions to form a calcium carbide slag in the arc. Using this basic slag the sulphur reduction is successfully accomplished in the minimum time, the average production containing 0.01 sulphur.

Milling and Forging the Ingots

Skinning the ingots has proved one of the most difficult mechanical problems in the Huntington plant. It was necessary to develop special milling machines using high-grade, high-speed cutting tools which are

entirely successful for this work. It has been found essential, however, that the milling be very carefully done and that the last traces of surface defect be removed, because otherwise these surface defects forge or roll into the metal instead of scaling off, as in the case of steel. After practically all the surface defects have been removed by the milling machines, small residual surface defects are eliminated completely by workmen using air hammers. These men go over every surface of the ingot with as great care as does the skilled dentist in examining one's teeth.

After proper cleaning, the ingot is reheated in large furnaces fired by surface-combustion natural-gas burners. The hot ingot is then forged on a 20-ton steam hammer to an 8x8-in. billet, if it is to be rolled for rod, flats or squares, or is forged to 9x5-in. billets if required for sheet bar. In general the forging requires one reheating between operation on the large hammer and finishing on the smaller 12-ton hammer. In this respect a much greater rate of cooling of nickel and Monel metal than the rate of cooling steel is noticeable. For the same amount of treatment, steel would probably require no such reheating, even though the lowest temperature at which it could be safely forged were the same.

From the forging department the billets go forward to the 24-in. mill, where they are rolled to sheet bar for sheet mill or billets for merchant mills. In the sheet mill the bars are cross-rolled into sheets of any desired gage, width and length. The merchant mills roll rod, flats and squares. In the latter mill all sizes of rod from $\frac{7}{32}$ to 4 in. diameter is made; the flats run from $\frac{1}{8}$ to 2 in. in thickness and from $\frac{1}{2}$ to 8 in. in width; and squares from $\frac{3}{8}$ to 2 in. are commonly made. This mill makes no wire, though the small size rod above referred to is virtually a heavy wire product. It is, however, rolled and not drawn.

Scrap Disposal an Important Plant Problem

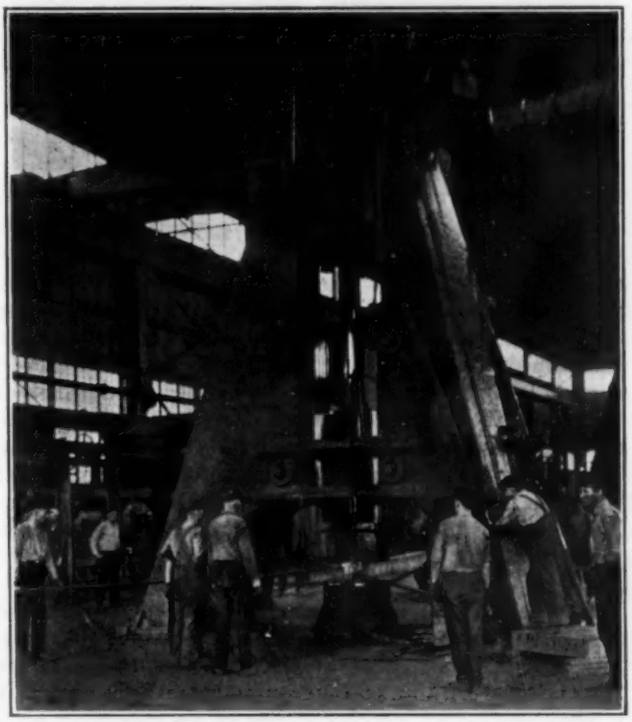
As is the case with any other metal difficult to smelt or roll, the production of scrap in this plant is considerable. However some scrap is essential for maintenance of furnace conditions at the best point, so that this is not entirely a disadvantage. At the present time the Huntington plant is working up not only all of its own scrap but also all of the scrap metal returned to it by fabricators who are customers of the company.

The company has adopted a very generous policy in purchase of scrap from any customer who will take pains to keep his scrap metal clean and free from contamination. As a result, the company points to a great lowering in the net cost of its products to a careful user, especially if the process of the user company inevitably produces a considerable percentage of his raw sheet or rod in the form of unused scrap, too small for further fabrication.

Protecting Its Electrical Equipment

No discusion of the Huntington plant would be adequate without special mention of the electrical equipment used. Individual unit drive is used throughout the plant. Much of the machinery is driven by motors with special types of electrical control, built particularly for this work—in fact, one representitive of the company suggested that much of the work on the electrical machinery could not possibly have been done had not the equipment been installed at a time of very low demand for electrical machines.

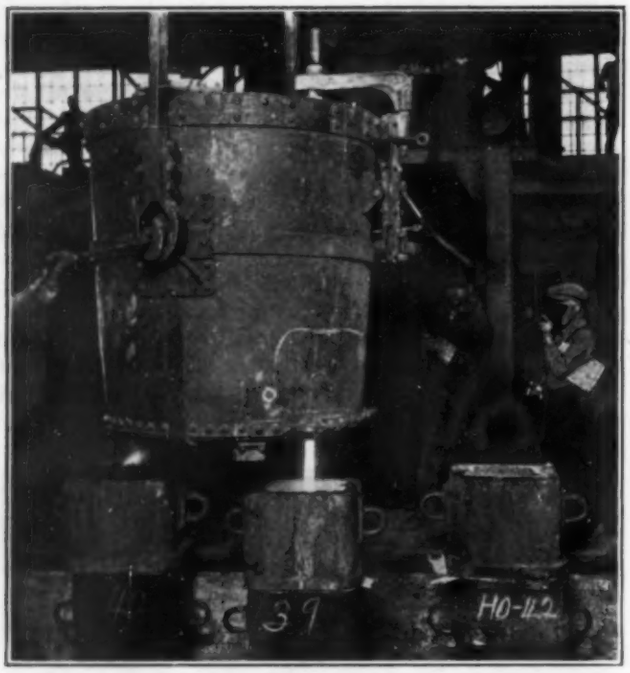
Throughout the plant great care has been taken to have first-quality electrical equipment installed and then due regard has been had for the care and maintenance of this equipment. The housekeeping of the plant as a whole is excellent, but no metallurgical plant can be free from dust and dirt, which is distinctly the enemy of electrical machinery and electrical control equipment. In this plant this fact has been admitted at the start and all of the electrical control machinery throughout the various mills is adequately housed. This does not mean that the switchboards, etc., are shut up in little coops of corregated sheet metal, tucked in at more or less inaccessible parts of the mill buildings with generous cracks for dust to filter in at every side. Quite the contrary is the case. Substantial brick wall structures of generous sizes, carefully designed for the local need, are built and roofed over within the mill buildings. It may seem absurd to think of a brick structure of this sort inside the large large well-built steel-frame sheet-metal mill buildings. But the condition and appearance of the electrical equipment after 15 months operation is good evidence already that the policy of protecting the electrical equipment is going to pay the company well.



FORGING INGOT UNDER 5-TON HAMMER

Special Rolling Mill Drive

Several of the motor drives, electric cranes and other parts of the power equipment are specials, but among these the one of which the local electrical engineer is most proud is the special electric drive for the 24-in. merchant rod mill. This mill consists of a series of units tapering down from those to receive the 4x4-in. rod-billet to those for the smallest size wire rolled. Naturally, each unit must vary in speed in accordance with the size of the rod which it rolls. Moreover the unit as a whole must vary in speed and yet all of this must be done with a minimum variation in power. Ideal conditions would require maximum flexibility in



POURING INGOT FROM 3-TON BOTTOM-POURED LADLE

speed with no change in power application. To accomplish this result General Electric and Westinghouse engineers have developed a peculiar double-motor combination drive. Instead of taking up the fluctuation in current on the main driving motor by means of rheostats, the extra current is put through a separate motor-generator set and the generator current produced returned to a second motor mounted on the same shaft with the main motor of the rod-mill drive. This peculiar electrical hook-up is proving eminently satisfactory.

Furnace Charging Machines

Another of the novel electrical devices is a special furnace charger for handling the billets into the heating furnaces and out of these furnaces onto the tables for the feed of the rolling equipment. This device is a Brosius charger which consists of an operating platform with electrical control devices hung flexibly by two heavy chains from the overhead crane and motor mechanism. The crane mechanism has right and left, front to back, and rotating motions. The beam of the charger is elevated and lowered by a cable from the overheading mechanism, affording a fourth motion; and the gripping mechanism at the end of the beam affords the fifth.

Because of its free swinging characteristics this charger can be operated at much higher speeds backward and forward between furnace and rolling mill than would be possible if there were a rigid support on the operating platform. In fact the operator takes full advantage of this flexibility in his swings around corners and his swerves to have the beam holding the hot billet pass directly over the rolling mill receiving table. Because of the flexibility, the skilled operator can whirl around, advance, drop his charge, continue the swing and return to the oven in what appears to be almost one continuous motion instead of going forward to position, dropping his charge and then reversing operations as is necessary with a rigid-type charger.

It is not necessary in connection with this discussion of the plant to give much attention to the uses or characteristics of malleable nickel or Monel metal. Those desiring information on this subject can readily consult earlier publications, particularly one in the *Bulletin* of the A.I.M.E., September, 1919, and the advertising literature of the company. It is of interest, however, to note the careful chemical control required for maintenance of quality.

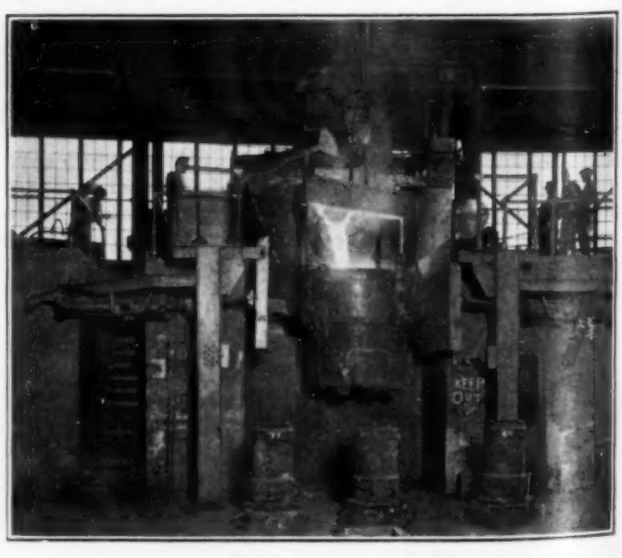
In accordance with steel mill practice, a complete record of analyses is kept of each heat, a furnace sample being run for control before tapping or pouring and ladle samples of the metal as cast into ingots. These tests include determination of S, C, Fe and Si. At less frequent intervals the Ni, Cu and other constituents are determined. Physical tests and metallographic observations are also made regularly for control of metal quality.

With most Monel metal it is desired to have a small percentage of iron present in order to get some advantage from the increased tensile strength afforded. However, the iron content is kept below 3.5 per cent in order to avoid the objectionable corrosive characteristics which large percentages of iron introduce. In the case of the pure nickel, of course, a low iron content assumes increased importance, for if the final purity of the nickel is to be 99 per cent or better, as is commonly required, there is very little margin for variation in the iron percentage.

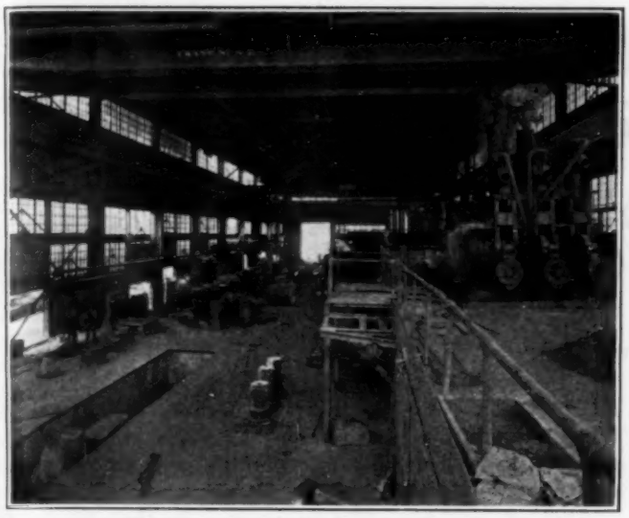
The percentage of sulphur in the metal, whether Monel metal or nickel, is of very great importance. No other single constituent is as closely watched unless perhaps it be the carbon content, which must be maintained within a narrow range.

At the Huntington plant commercial high-purity malleable nickel is made; also as required electrolytically refined, very high purity cathode nickel is rolled there. The electrolytic process is carried out only at the Port Colborne plant, where material of 99.8 per cent Ni and approximately 0.1 per cent of iron and 0.1 per cent of copper is made.

Quite frequently this plant is called upon to make special products such as reduced nickel, a fine metallic powder. The low-purity material of this sort, about 97 per cent nickel, is commonly used in the Edison-type storage battery. A purer grade is also occasionally made, containing 99 per cent plus of nickel.



POURING INTO LADLE FROM THE 7-TON HEROULT ELECTRIC FURNACE



INTERIOR VIEW OF REFINERY, SHOWING POURING PIT ON LEFT, ELECTRIC FURNACE ON RIGHT

Both these grades are made very simply by taking nickel sulphide, calcining it to an oxide, and processing it with charcoal. This processing takes place at such low temperature as to prevent any melting of either nickel oxide or metal, but at sufficiently high temperature so that vigorous combustion of the charcoal takes place with the formation of the carbon monoxide, which reduces the oxide to metal. Naturally the atmosphere of this furnace has to be maintained slightly reducing in nature.

The product when raked from the furnace contains several per cent of excess charcoal, a small amount of oxide and traces of sulphide. It is freed from all of the charcoal, some of the oxide and much of the sulphide by a small magnetic separator, especially designed for the work. The metal is distinctly magnetic and the oxide is magnetic to some extent. A sharp separation from the charcoal is, therefore, possible. The high-grade reduced nickel made in this manner is proving to be a favorite raw material for manufacture of nickel salts.

Progress Made in Eliminating Defects

Being white metals susceptible of taking a high polish, nickel and Monel metal are bought for many display purposes, where the physical appearance of the sheet is of prime importance. Discolored sheets at times appear in the rolling and are of course rejected as scrap. Considerable progress is being made in the elimination of this difficulty. Another trouble that sometimes occurs is black flecks or minute surface defects which impair the appearance of the sheet. Hitherto it has been regarded as entirely impossible to eliminate this sort of trouble by pickling; but a new method with very careful control in the pickling bath has recently been developed at Huntington, and this gives great promise for future work in this line.

Where other processing does not give a sufficiently fine finish to the sheets, they are ground. This, of course, represents a distinct increase in cost, but one that is often justified on the score of the improved appearance which the product made from the polished sheet may have. At present in the Huntington plant the grinding is done on power-driven grinding wheels with the sheets supported on large wooden tables that are moved about by hand under the grinding wheel.

Special fine-finish or hard-surface nickel rod is very often required. For this purpose, special cold-drawn nickel is preferred, as the cold drawing gives a fine-grain hard surface which cannot be obtained on hot rolling. The Huntington plant is equipped with a small special cold-drawing machine used for die drawing of rod. Selection of the raw material for this drawing, of course, demands special care; but proper coating of the rod with a very fine non-scratching lime as a lubricant of the drawing die is quite as important.

Extension of Plant and Research

In general, the Huntington plant confines its work to the standard grades of nickel and Monel metal, but research and development work is continually in progress both on a small and on a plant scale on new alloys. With great promise for development of nickel in manufacture of cooking utensils and in many industrial operations, the company forecasts distinct increases in plant capacity at Huntington. At the present time this plant, which now represents an investment of between $3,000,000 and $4,000,000 on approximately 80 acres of land, is producing slightly over 1,500,000 lb. of nickel and Monel metal per month. The limiting factor in capacity is the output of the refinery, and already an extension on the refinery building is under way for the installation of new furnaces. With this installation it is expected that the productive capacity of the plant will be materially increased within the next few months, thus assuring greater promptness of delivery and a higher general industrial possibility for the metal.

In order to extend its service to users, the company has recently authorized a new branch of the research department which will be located at Bayonne, N. J. At that point particular attention will be given to the problems of nickel and Monel metal users. The work there will be under the direction of Dr. Paul D. Merica, who has for some time been in charge of the research of the company.

Can Glue Replace Casein in Paper Coating?

The Bureau of Standards is carrying out some experiments dealing with the use of glue in coating paper. During the past month nine runs have been made on the experimental coating machine, using two makes of bone glue for eight of the runs and a French casein glue for one. The clay used for all runs was Lee Moor, a good grade of English coating clay. The results indicate that the water resistance of glue-bound coating containing chrome alum compares favorably with that of casein-bound paper containing no formaldehyde. It is believed that the degree of waterproofness will prove sufficient for most of the papers used for halftone printing. Difficulties have been experienced in obtaining a uniform coating, because of variation of the fluidity of the coating mixture and mechanical defects in the machine, so that additional work will be necessary before paper suitable for printing tests can be produced.

Acknowledgment

In the Sept. 10 issue of *Chem. & Met.*, page 448, a cut of a flotation machine was improperly printed over the caption of a "hydraulic classifier." Opportunity is taken here to remedy the error.

Carbonizing Coal at Low Temperatures in the Fusion Retort

A Process Which Gives a High Yield of Oils and Little Gas—It Can Be Used for Shales and Cannels as Well as for Coals

By C. H. S. Tupholme
London, England

THE outstanding features of the fusion process are: 1. The employment of the principle of a chipping or hammer action in the retort to prevent the formation or growth of scale, and for the balling of the bituminous material during heat treatment.

2. Continuous feed of the raw material and continuous discharge of the material after heat treatment.

3. Uniform and gradual increase of temperature of the material.

4. A shallow bed of material, and constant stirring and movement of the material during heat treatment.

The combination of these features results in a very high yield of oil; a very low yield of gas, thus indicating the absence of cracking of the oil during the heat treatment; the absence of "poking" or other manual efforts on the plant; continuous operation of the retort owing to the absence of scale; low first cost or capital charge; and low running cost.

The raw material to be carbonized, coal, shale or similar substance, is fed into the rotary retort at a temperature slightly above atmospheric. This material travels forward through the retort, which is of the horizontal, continuous type, in a uniform thickness and at a uniform speed, scaling and caking being prevented by a very ingenious device without the aid of poking.

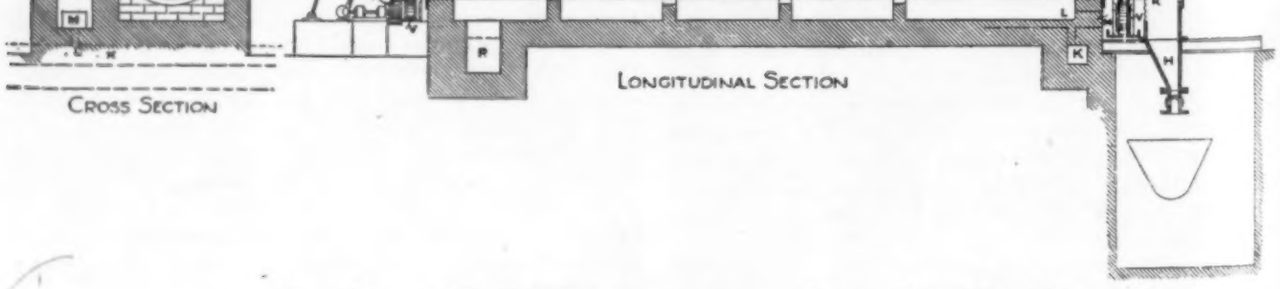
This retort design is based on the fact that to get the maximum yield, the fuel must be carbonized in a comparatively fine state, all passing through at least a ¼-in. mesh. Fuel of this size permits a low carbonizing temperature, as the heat can permeate the whole mass easily and quickly, thus minimizing cracking and decomposition of the lighter oils.

Another principle of this process is that the layer of carbonizing fuel should not exceeded a few inches in thickness to allow of the easy distillation of the oils and also to counteract the slow heat-conducting capacity of coal. Further features of this process are that the fuel undergoing carbonization is continually turned over, and that heating takes place gradually and quickly, the maximum carbonizing temperature being attained within twenty minutes. The process is also continuous.

How This Retort Is Designed

The Fusion plant consists essentially of the following three units: 1. The producer, combustion chamber and furnace. 2. The retort rotating in the furnace and its stationary feeding chamber. 3. The oil condensers. The material to be carbonized enters the retort, which rotates in a horizontal position in the furnace, through a mechanically operated feed gear which controls the quantity to be treated. The retorts are constructed in two types:

1. *Double-Tube Type.* This has an inner and an outer tube. The fuel delivered into the retort flows along the inner tube until it reaches the end, where it falls into the far end of the outer tube, flowing back



The 'Fusion' Rotary Retort. Single Tube Type.

A. Raw Material Hopper.
B. Air-tight Feed Valve.
C. Raw Material Guide Pipe.
D. Rotating Inner Tube.
E. Breaker or Pulverizer.
F. Rotating Outer Tube.
G. Ports with Dampers for conveying the products for combustion to the furnace round the Rotating Tube F.
H. Spent Material Hopper with air-tight Valve for discharge.
K Gas Feed Conduit.
L. Gas inlet to Combustion Chamber
M. Air inlet to Combustion Chamber
N. Combustion Chamber.
P. Flue to Chimney.
R. Gland for making joint between Feed Chamber and outer tube F
S. Feed Chamber.
T. Gear for rotating tube
V. Rollers upon which the tube rotates.
W. Oil vapour and gas outlet

through the annular space between the inner and outer tube and is ejected from the retort at the same end at which the material was fed in.

2. *Single-Tube Type.* The material in this case is fed in at one end and is ejected at the other.

The single tube is the essential of the process and will be discussed here. This tube consists of a steel cylinder, at each end of which is fitted a steel tire, resting on rollers so as to facilitate easy rotation of the cylinder. Such rotation may be effected either by spur wheel and pinion or any other suitable gearing. The retort is constructed in standardized sizes from 2 ft. 6 in. to 4 ft. diameter, and 25 ft. to 100 ft. in length; the capacities range from 5 to 100 tons of coal per day of 24 hours. One brake-horsepower serves to drive the 5-ton size, the speed of rotation being from 5 to 7 r.p.m.

Flow of the Fuel

It will be remarked that the retort is horizontal, not inclined as is the case with similar mechanisms for drying substances; and readers will be likely to wonder how the fuel is made to flow from one end to another. Flow of the material is assured by imparting a head of about 2 in. Accordingly, at the feed end of the retort the raw material is about 2 in. deeper than at the outlet end. The material being granular in nature, it tends to find its own level, and thus a regular and uniform flow is obtained; more so, in fact, than if the tube were inclined. This, in the heat treatment of material, is an advantage in so far as the flow at the feed end, where the temperatures are low, is at a slower rate than at the discharge end, where the temperatures are high.

Where a number of retorts are required they can be operated side by side in their independent furnaces. Thus, batteries of, say, 10 to 40 retorts can be operated in conjunction with a single producer and a single stack.

Standard Sizes of Units

There is a tendency to look upon a retort which will treat 5 tons a day as a large unit. Owing to the fact that low-temperature treatment must essentially, in the majority of cases, be on a large scale, a 5-ton unit would in such cases be all too small for economical working. As it will be appreciated, a unit of this type, no matter what its size, requires practically the same amount of labor; and, of course, one must remember that in first cost a number of small units is more expensive than one large unit. The Fusion Corporation, realizing this, has standardized its 5-ton unit as the smallest commercial unit, and while it has standardized the sizes, it will be appreciated that on different fuels the capacity per 24 hours of a given size retort will vary. But in normal materials its standard sizes are: units capable of treating per 24 hours 5, 10, 25, 35, 50, and 100 tons. It will be appreciated that where a plant is required for the treating of, say, 2,000 tons per 24 hours a number of units would be erected side by side.

Much is heard about the advantage of steam distillation and presumably this idea has got into the heads of the champions of steam distillation from the practice adopted by petroleum refiners, who, when distilling oil at the higher temperatures, introduce steam to prevent cracking. Presumably, the argument is that if it is right in treating liquids it must be right in treating solids. The arguments for and against are much too long to go into here, but if there is anything in the proposition, then those who know will admit that the amount of steam necessary is extremely small. Here again this retort scores in so far as the water held mechanically and in combination with the material being treated all passes, in the form of steam, over and through the material while under heat treatment. If there is anything in the argument, this may be one of the reasons for the absence of cracking of the oil in the Fusion retort.

How the Plastic State Is Dealt With

As is well known, the majority of bituminous materials in the absence of air pass through a plastic or semi-plastic state, while others pass through or into a liquid state. This pecularity of bituminous materials (coals, cannels, torbanites, shales, etc.) has not been fully appreciated by those who have attempted to solve the low-temperature distillation of these materials by a continuous process, with the result that while in many cases laboratory experiments on different systems have given satisfactory results, due to the fact that probably these laboratory experiments have all been done on the "batch" method, yet when it comes to the installation of a commercial plant where the process is continuous the result has been failure or semi-failure. Apart from any other troubles due to this peculiarity of bituminous materials, scaling on the walls of the retort is sufficient to cause failure. The growth of such scale is very rapid and the devices or common means applied for removing or preventing its growth are not very successful. The scale grows into an extremely hard mass, is extremely abrasive, and to attempt to scrape such material off is to court failure.

Those who have had experience find it very difficult to remove carbon scale from the walls of a retort by scraping, consequently the reason will be understood for the failure of the type of retort which employs a rotating tube and stationary scraper of the type, say, with a worm or paddles mounted on a shaft, or a stationary tube with scrapers of paddle type, mounted on a rotating shaft.

Removal of the Scale

The means that have been used in the Fusion process for the removal of this scale is that of chipping; and further, which is quite as important, the chipping action is applied at the birth of the scale, not after it has grown. Now, a scraper, obviously, cannot come into intimate contact with the walls of the retort. There must be some clearance. This permits the birth of the scale. In the Fusion retort the main tube rotates and in this tube there are a number of breakers or pulverizers covering the whole length of the retort. These breakers or pulverizers are placed loosely and freely in the retort—that is, there is no mechanism such as a shaft or gearing for driving them. In design, these breakers are somewhat similar to elongated paddle wheels with the exception that the number of blades may be from three to ten.

The scraper is of comparatively small diameter and great length. In other words, the diameter across the blades is approximately about two-thirds of the internal diameter of the retort tube, and the length is such that say four, or six, or thereabouts, of these devices are equal to the whole length of the inside of the tube. As the tube is rotated these breakers or

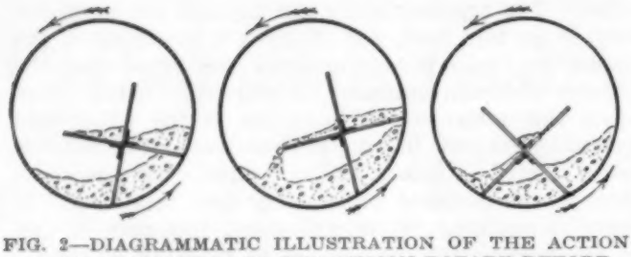


FIG. 2—DIAGRAMMATIC ILLUSTRATION OF THE ACTION OF THE BREAKERS IN THE FUSION ROTARY RETORT

pulverizers fall over and over from one blade to another; and, having regard to the diameter of these breakers and the few blades, the actual blow given is considerable. As the blade is sheet steel of about ¾ in. thickness it is not only a chipping action but a cutting action.

How the Breakers Work

From this description one might be led to believe that the retort would be noisy in action and that these breakers would very soon knock the retort tube all to pieces. But in practice this is not so, as the edge of the blade falls upon the bed of the material being treated and consequently not only prevents the birth of scale, but minimizes the caking tendency of the material itself. The blades also act as diggers or excavators, so that in addition to the constant movement of the material being treated due to the rotation of the retort, there is additional movement of the material through the action of these breakers in digging into and carrying a part of the material around to the other side of the retort as they fall over and over. Thus, material which at one moment is farthest from the tube is at the next moment in intimate contact with the tube, so that each particle has its turn for heat treatment as it gradually flows down the retort from the feed end toward the discharge end. Time after time it comes into contact with the heating surface as it flows in the direction named, gradually being subjected to a constantly increasing heat. In fact, the 12 to 25 per cent increase in the yield of oils is attributed to the latter action of the breaker.

The weight of the breaker in the 5-ton retort is around 250 lb. In action only a gentle thud is heard, otherwise the rotation is silent. In effect the breaker action is hammering, not scraping; a scraping action would be not only dangerous but ineffective.

It is recognized and agreed that gradual increase of temperature of the material to be treated not only assures high heat efficiency but the best oil yield and the best oil. Yet, while this is admitted, one sees many types of retorts which claim this advantage but in practice do not realize it. In a vertical retort the flow of material obviously cannot be continuous and uniform, and apart from the holding up due to caking, balling and scaling, the core of any granular material flows at a quicker rate than the periphery. In a horizontal retort, where the material is carried forward by means of a mechanically driven worm, paddle, etc., here again the flow cannot be uniform. The blades cannot in practice touch the tube or trough and material is always left behind. Therefore the flow of a given bulk of material is not uniform.

Feeding the Retort

The feeding arrangement is automatic and is in itself driven by the retort, but the quantity to be fed in a given time may be varied with ease and without stopping the retort. The discharge of the residue is carried out mechanically and is automatic and the arrangement is such as to prevent the feed overrunning the discharge. In other words, the discharge valve will always discharge the quantity of material which it receives. Both the feed and discharge arrangements automatically seal themselves so as to prevent the escape of vapors, gas, etc.

A difficult "snag" in any system where a revolving retort is connected with a stationary chamber is the design of a gas-tight gland which will operate without friction. Many types of glands have been tried, but the trouble is due not only to the initial fit but also to the fact that the tube, when wear eventually takes place, will not run exactly true.

In this retort, where it enters the chamber, an annulus of thin steel plate is fitted on the side of the cast-iron chamber. So as to make its movement uniform and to prevent warping or twisting, annular corrugations are formed on this ring. The rim inner edge is pressed against asbestos by springs. This asbestos ring is fitted to the retort, the outer edge of the annulus being fixed to the hood which covers the discharge end of the retort. It is on this hood that the gas and oil outlet is fitted.

The producer gas for heating enters the chamber surrounding the retort at one end and the raw material enters at the other, so that this is exposed to a gradual rise in temperature. The walls of the furnace closely surround the retort, and are carried to within a few inches of each end.

Heating the Retort

In heating, producer gas is fired into the combustion chamber, which is lined with firebrick and reinforced outside with staybars. Here the producer gas meets the appropriate supply of air and combustion takes place. The flames pass through holes in the wall between the chamber and the furnace, and the carbonizing temperature is controlled by damping the gas and air supply.

The products of combustion pass down the furnace from the discharge end of the retort toward the feed end of the retort, and by the adjustment of dampers the temperature can be arranged to be, say, 500 deg. C. at the discharge end and gradually reducing down to the feed end to, say, 100 deg. C., or it might be arranged half way down the retort and then dropping from that point down to, say, 100 deg. C. Or in the case of the treatment of special materials it might be,

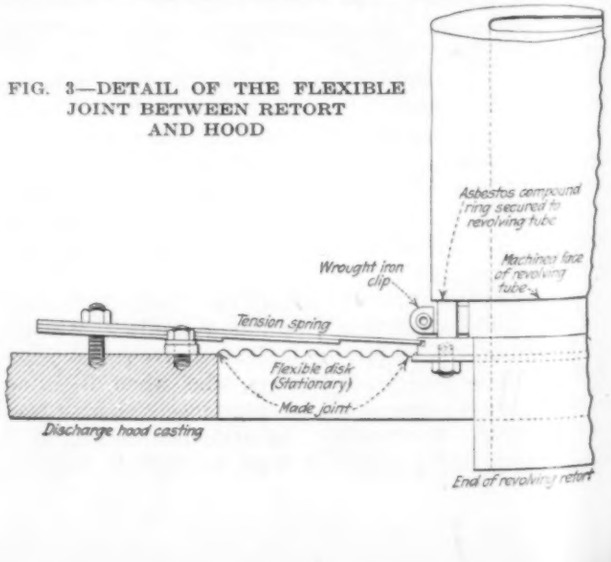


FIG. 3—DETAIL OF THE FLEXIBLE JOINT BETWEEN RETORT AND HOOD

say, 500 deg. C. at the discharge end, suddenly dropping to, say, 300 deg. C. during the length of one-third of the retort, maintaining that temperature for, say, one-third of the length of the retort, and then dropping down to, say, 100 deg. C. at the feed end—that is, the chimney flue end of the retort. Sight holes and examination doors are provided in the walls of the chamber.

A connection is mounted on the stationary chamber for the purpose of carrying off the gas and oil vapors. The oil vapors go from the chamber to the condensers, which may be of any approved type, and the gas may be employed in the combustion chamber if it is not required for other purposes. The condensing plant is located at the end of the retort and consists of wrought iron or steel water-cooled tubes. The condensed oil is run into a receiver, and the gas is passed to a purification or storage plant.

Product of the Fusion Process

From 1 ton of a good average carbonizing coal, the following result is typical: gas, 1,830 cu.ft.; oil, 37½ gal.; residue, 1,657 lb. (74 per cent).

The yield of gas rarely exceeds 1,800 cu.ft. and has been as low as 1,000 cu.ft., thus indicating that the lighter oils are not cracked, and that there is a larger yield at the lower specific gravity. The gas is rich, from 750 to 900 B.t.u. per cu.ft.

The following table is typical of the oil yields from the Fusion process:

	Cannel	Torbanite	Coal Dust	Shale
Gallons of oil recovered per ton of undried material, exclusive of oil recovered by scrubbing off gas	47.04	115.36	14.34	56.5
Specific gravity of oil	0.9815	0.8712	1.0322	0.9137
Percentage of volatile in residue	9.29	5.3%	2.23%	3.73%
Percentage carbon in residue	87.58	31.87%	67.57%	48.66%

The residual coke is not immediately suitable for household purposes owing to its fine division. For this purpose it is briquetted with a pitch binder at a cost of about 1s. 6d. per ton. The volatiles left in the residual coke vary from 7 to 10 per cent, according to the temperature conditions of the retort. In its briquetted form the fuel is highly efficient.

Besides the treatment of shales this retort has proved itself very effective in dealing with coals of high carbon content, especially where caking and swelling is encountered—for instance, in Kent coal, which swells to 2½ times its original volume.

One criticism is that this type of plant is dusty—in other words, that large quantities of dust are created and carried over with the oil and reduce its value. In the first installation it was believed that this would happen, and consequently a large dust catcher was installed. It was found, however, that this dust catcher was not warranted. It is only with a few materials that any trace of dust in this dust catcher has been found. In a large number of cases not only has there been no dust in the dust catcher but there has been no dust in the hood or end chamber of the retort itself, after long runs.

The plant can be easily adjusted to various retortable materials by altering the heat of the furnace, the speed of rotation, the speed of the automatic air-tight feed valve and the weight and shape of the breakers.

The plant is not expensive to install, requires little power to operate and is entirely self-acting, the charging and discharging being automatic. It is estimated that a plant of three 20-ton retorts, complete with driving arrangements and condensers, costs around £2,600 to install and operate, or about £45 per ton of coal carbonized per diem—a very low figure. Labor costs 1s. 3d. per ton carbonized, and repairs, stores and maintenance another 1s. 6d.

How Sulphuric Underlies Production of Other Acids

In a recent Bureau of the Census report of manufactures in this country, some valuable sidelights on the production of acids appear. Sulphuric acid may be considered the fundamental of the acid group, since nearly all other acids are made through its instrumentality, with the difference that sulphuric acid does not figure in the final product, but remains with the residual salt or byproduct of the process.

To show how extensively sulphuric acid is employed in the production of other acids, a synopsis of methods of manufacture is given:

A.—Direct action of sulphuric acid (usually upon a natural salt or byproduct of another process), liberating free acid.

Acid Set Free	Natural Salt or Byproduct; Source
Acetic	Acetates, wood distillation industry.
Boric	Borax from lake brines.
Carbolic	Coal-tar fraction, after caustic extraction.
Carbonic	Limestone or marble.
Chlorsulphonic	Chlorine and sulphuric acid.
Citric	Citrates, citrus fruit industry.
Gallic	Tannic acid, extracts industry.*
Hydrobromic, Hydrocyanic	Brines from mines and lakes.
Hydrocyanic, Hydroferrocyanic	Gas, coke, and beet sugar industries.
Hydrofluoric	Fluorspar or cryolite.
Hydrofluosilicic	Flourspar and sand, or byproduct phosphate manufacture, fertilizer industry.
Lactic	Lactates, dairy industry.
Mixed	Mixture, nitric and sulphuric.
Nitric	Chilean saltpeter.
Oxalic	Sawdust, lumber industry.*
Phosphoric	Bone ash or phosphate rock.
Phthalic	Naphthalene, coal-tar industry, with catalyst.*
Tartaric	Tartrates, wine industry.
Valerianic	Fusel oil, distillation industry, with bichromate.†
Vanadic	Carnotite ores, byproduct radium industry.

*Action of boiling dilute sulphuric acid—hydroxylation.
†Action of concentrated sulphuric acid—oxidation.

B.—Action of sulphuric acid, after a preliminary operation.

Chromic	Alkaline fusion chrome iron, ore then sulphuric acid.
Silicic	Alkaline fusion quartz, then sulphuric acid.
Tungstic	Alkaline fusion tungsten ore, then sulphuric acid.
Formic	Alkali heated under pressure with CO, CO_2, or CO_2.
Hypophosphorus	Barium hydroxide heated with phosphorus.
Lactic	Specific bacterial fermentation, starch paste or sugar from corn, potato, molasses, etc., neutralized lime, then sulphuric acid.
Butyric	Same general method as lactic, specific bacteria.
Caproic, Caprionic	Similar to lactic.
Oleic	Alkaline saponification, fats and oils of slaughtering and meat packing, olive and cottonseed oil industries, then sulphuric.
Stearic	Similar to oleic.
Oxalic	Formic acid process continued with more heat, neutralized lime and sulphuric acid added.

C.—Acids not employing sulphuric acid.

Arsenious	Roasting arsenical pyrites.
Molybdic	Roasting molybdenum sulphide ore.
Chloracetic	Chlorine passed into acetic acid.*
Glycerophosphoric	Glycerine and phosphoric acid heated together
Pyrogallic	Gallic acid heated in autoclave with water.
Tannic	Extract of gall nuts.

*Acetic and phosphoric acids and sometimes chlorine produced by use of sulphuric acid.

D.—Additional methods developed for important acids, largely synthetic.

Acetic	Bacterial oxidation of alcohol. Synthesis from acetylene, catalytic.
Carbonic	Combustion, organic material. Fermentation, organic material.
Hydrobromic	Fermentation of sugar.
Citric	Synthesis from hydrogen and bromine, catalytic.
Hydrochloric	Synthesis from hydrogen and chlorine. Byproduct, Le Blanc, soda process. (Class *A*) Byproduct, chlorination processes.
Nitric	Synthesis of nitrogen and oxygen, electrolytic. Synthesis from ammonia and oxygen, catalytic.
Phosphoric	Synthesis from white phosphorus and oxygen.
Stearic	Synthesis from oleic, catalytic hydrogenation.

Steel Treaters Discuss Technology at Pittsburgh

Fifth Annual Convention of A.S.S.T. Is Featured by Fine Program of Technical Papers and Largest Steel Exposition to Date

EDITORIAL STAFF REPORT

THE fifth annual convention and exposition of the American Society for Steel Treating at Pittsburgh the week of Oct. 8 was a great success from every viewpoint. It was well attended, the papers presented at the technical sessions were excellent and the discussions following these papers were lively. The exposition was one-third larger than last year and was visited by 60,000 persons.

At the annual meeting of the society it was suggested in the report of the constitution and bylaws committee that the statement of the object of the society be changed from "for the advancement of the arts and sciences relative to the treatment of iron and steel" to "the advancement of the arts and sciences relative to the manufacture or treatment of metals, or both." This was discussed at length and seemed to be considered favorably. This brought up the question of changing the name of the society. Professor Boylston suggested that it be called the American Institute of Metals or the American Metallurgical Institute. After considerable discussion, it appeared that a change of name would not likely take place in the near future. This matter, however, is of great interest, as it shows how the scope of the society has broadened, and will give non-members a better idea of the field it covers.

The Steel Exposition was held at Motor Square Garden, which, though 6 miles from the William Penn Hotel, the convention headquarters, proved to be an excellent building for such an exhibit. Gas, air and electricity were available, and consequently a large portion of the exhibit consisted of actual industrial operations. Real progress in heating methods, testing methods, control devices, heat-resisting metals and other refractories was evident. One or two of the exhibits were interesting from a purely mechanical viewpoint. The Keller Mechanical Engraving Co. exhibited in public for the first time its die-sinking machine in operation. This remarkable machine duplicates in steel a die or other odd-shaped piece of which a dummy of wood or plaster is supplied. The Tinius Olsen Co. showed several very fine new testing machines, including a most remarkable device for balancing rotating parts. This machine indicates not only the direction of static unbalance but the dynamic unbalance, a point which is too little considered, but which is of enormous importance in any machine.

TECHNICAL PROGRAM FEATURES

Stanley P. Rockwell's paper on "Measurement of Carbon Penetration in Carburized Steels" was very valuable, because it showed how little is known of carbon penetration. Not enough thought has been put on this subject, because it has seemed that we knew a good deal about it. Mr. Rockwell's paper was really a question, "How deep is a given case?" Two other questions also important are: "How deep need a case be for any given purpose?" and "How do you produce that depth of case?" How little is known of the subject is shown by the fact that after we get a case, we do not know how deep it is. Where is the bottom? Where does the case leave off and the core begin? The gradation is so gradual and variable that no one can definitely say.

Sam Tour's paper on "Salt Baths and Containers" was attended with interest and started a lengthy discussion. Mr. Tour has investigated salt bath combinations containing chlorides in considerable detail. He seems to have found none that was wholly satisfactory. All of his baths which did not corrode the steel tools immersed in them decarbonized the tools after the baths had been in action for some time, and it was found to be impractical to balance this decarbonizing action by adding cyanide to the bath. It was brought out in the discussion following the paper that there are salt baths on the market which have none of these disadvantages, and which are very successful. The manufacturer does not give out information regarding their composition and manufacture, and we understand that one of these baths is of a composition analogous to that of an igneous rock, and so is practically impossible to reproduce from the analysis. Mr. Tour said that he found pressed steel pots more satisfactory and less costly than cast pots of any of the many materials that he tried.

HARDNESS THEORY DISCUSSED

"The Hardening of Steel," by Zay Jefferies and R. S. Archer, presented by the latter, was received with great interest and was followed by a lively discussion. The authors' theory that the hardness of a metal is due to the "keying" of the slip planes by hard particles present in the metal was explained in an exceedingly clear and concise manner. In steels, the "keying" particles are composed of carbide precipitated from the solid solution and the size of the particles for maximum hardness is taken to be between the size of an atom and one hundred-thousandth of an inch in diameter, or probably one ten-millionth of an inch in diameter. A quantity of evidence was presented to substantiate the theory. It is worthy of note that it explains very nicely the strength of Duralumin.

After the reading of the paper, notes of warning were sounded by Professor Boylston and Dr. Hoyt, suggesting that care be taken not to consider the theory as completely acceptable until it has been thoroughly proved

to the satisfaction of all concerned. It was suggested that especial weight had been given to that evidence which best seemed to uphold the theory, but Mr. Archer showed quite clearly that they had endeavored to give equal consideration to all facts that seemed to have a bearing on the case, and that they were after the truth, whether it coincided with their theory or not.

H. J. French described an investigation conducted at the Bureau of Standards of the heat-treatment of high-speed steel, especially in connection with lathe tool performance. An idea of the magnitude of this investigation is given by Mr. French's mentioning that 17 tons of steel was cut up during the tests. The effects of about all possible variations of standard high-speed steel hardening were carefully noted and classified. In the discussion that followed the paper several speakers, including Mr. French himself, emphasized the point that the best heat-treatment for a high-speed steel lathe tool is not necessarily the same as that for the majority of high-speed steel tools, as the latter do not take so heavy a cut nor work at so high a temperature.

A paper by H. S. George gave a description of a new so-called conical method of illumination in metalography. This method, invented by Mr. George, produces photomicrographs of real beauty and brings out relief so effectively as to make the picture much more readily interpreted.

Hardness Testing Symposium

An important session was the Hardness Testing Symposium, under the chairmanship of Major A. E. Bellis. This was a meeting of the hardness testing committee of the Engineering Division of the National Research Council. In addition to the presentation of two papers on general hardness testing, there were two fine talks by A. V. de Forest and Mr. Herbert of London, the inventor of the Herbert Hardness Tester. Mr. de Forest told something about his recent work on the magnetic investigation of steel to determine its mechanical properties, and Mr. Herbert described the use and action of his new machine.

Each of our many hardness testing machines measures a different property which is called "hardness" for want of a better term. We measure the hardness of a specimen in the hope that it will give us an indication of the performance of that specimen under operating conditions, but seldom can we measure the same property or combination of properties that we shall make use of in practice. The hardness testing committee has made real progress during the past year. A year ago it was deplored that the word "hardness" had so many meanings that it was of little use. Now they are beginning to measure the various "hardnesses" or combinations of properties with the hope that certain combinations of combinations will give indications of the behavior in practice of the piece of metal under consideration. The Herbert Hardness Tester measures two properties or combinations of properties of the specimen, the indentation hardness and resistance to flow. The de Forest magnetic investigator measures two combinations of properties, electrical properties which are found to be related to the mechanical properties. In each case, we get the equivalent of a pair of simultaneous equations and can evolve a figure indicative of the property in which we are particularly interested.

Co-ordination of thought and effort made possible by the National Research Council is beginning to produce the results long hoped for.

Tentative Methods for Sampling Fertilizer

In addition to following the directions for sampling fertilizers prescribed by Section 5 of the California fertilizer act of 1903, inspectors of the Division of Chemistry, Department of Agriculture, are instructed that:

(1) A trier shall be used in sampling fertilizers contained in bags or barrels. If the fertilizer is in bags, the trier shall be inserted lengthwise of the bags; if in barrels, the trier shall be inserted crosswise.

(2) If in lots of more than 5 tons, not less than 10 per cent of the packages shall be sampled.

(3) After the required number of packages of a lot have been sampled, the material shall be placed on a sheet of oilcloth, laid on a smooth, clean surface, and mixed by rolling as follows: Lift one corner of the sheet as high as it will go without spilling the contents. Then straighten back the sheet and lift the opposite corner in the same way. Repeat with the third and fourth corners. Then spread the material out over the sheet and repeat the operation twice as before.

(4) If the mixed sample occupies no more than 2 qt., spread it out in a circular, flat pile and divide into two equal portions by quartering, using two opposite quarters for each portion.

(5) If the mixed sample occupies more than 2 qt., reduce to the desired size by repeated quartering and discarding two opposite quarters. Then divide into two equal portions as above.

The fertilizer law requires that all analyses be made according to the methods agreed upon by the Association of Official Agricultural Chemists. The following is the official method for the preparation of a sample of fertilizer:

"Reduce the gross sample by quartering to an amount sufficient for analytical purposes. Transfer to a sieve having circular openings $\frac{1}{25}$ in. (1 mm.) in diameter, sift, breaking the lumps with a soft rubber pestle. Grind in a mortar the part remaining on the sieve until the particles will pass through. Mix thoroughly and preserve in tightly stoppered bottles. Grind and sift as rapidly as possible to avoid loss or gain of moisture during the operation."

The Association of Official Agricultural Chemists recommends that the entire sample submitted to the chemist be passed through a 10-mesh sieve previous to its subdivision for analysis.

Furnace With Novel Method of Control Is Developed

A heat-treating furnace which is especially adapted to the handling of shafts and other long narrow parts has been patented by L. C. Josephs, Jr., and G. Wirrer of the International Motor Co. The furnace has several chambers of differing temperatures for heating, quenching and drawing the part to be heat-treated, which is automatically transferred from chamber to chamber. The particularly interesting and novel feature is a device whereby the shaft is removed to the quench at just the right time—i.e., when it has been heated through its critical point. This is accomplished by a mechanism which makes an electrical contact when the rate of expansion of the shaft being heated changes. Thus use is made of the fact that the volume of a piece of steel depends upon its structure, which changes at the critical point.

What Are the Scientists Talking About?

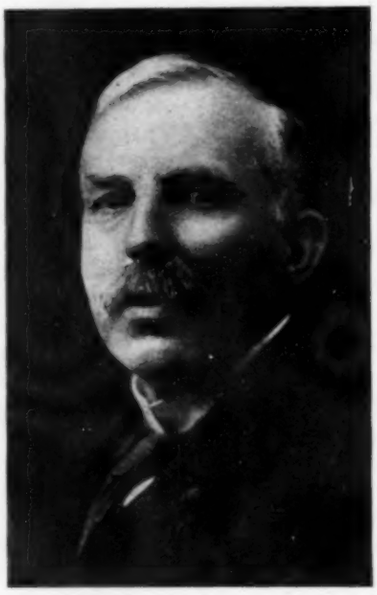
A Brief Review of Some of the Important Happenings at the Liverpool Meeting of the British Association for the Advancement of Science

BY OUR LONDON CORRESPONDENT

OF THE many successful meetings that have been held by the British Association for the Advancement of Science, few have surpassed in interest and importance that of the Liverpool meeting, Sept. 12 to 19, 1923. The Liverpool meeting excelled not only in quality but in numbers, the attendance of 3,296 members being the third largest in the history of the association—nearly double that of last year's gathering in Hull.

As on former occasions, excellent provision was made for the entertainment as well as for the instruction of the visitors. No fewer than sixty excursions were arranged, and of these the visits to the works of the British Aluminium Corporation at Dalgarrog, North Wales, of the United Alkali Co., Levers' and Crosfields', the Highfield Tanning Co., at Runcorn, and Bryant & Mays, were of especial interest to members of Section B (Chemistry).

The first evening was, as usual, devoted to the delivery of the presidential address, and on this occasion Sir Ernest Rutherford had the satisfaction—and the ordeal—of speaking extempore to an audience of about 2,200 in the Philharmonic Hall and, by means of "wireless," to a vastly greater number outside. The subject of the address was one which the speaker has made peculiarly his own, "The Electrical Structure of Matter." The address is reproduced in full in *Nature* of Sept. 15.



Sir Ernest Rutherford
President of the British Association for the Advancement of Science

SECTIONAL MEETINGS

At the Liverpool meeting a very successful joint discussion on Cohesion and Molecular Forces was held by Sections A, B and G (Engineering). Sir William Bragg (the successor of the late Sir James Dewar at the Royal Institution) opened the discussion with an address on the bearing of crystal structure, as revealed by X-ray analysis, upon the problem of cohesion—the old question, as Sir Oliver Lodge put it, of explaining why, when we lift one end of a stick, the other rises also. According to Sir William, the nature and structure of the atom and the mode of attachment of atom to atom and molecule to molecule are the fundamental considerations, and no complete explanation of such physical properties of materials as elasticity, strength and endurance will be possible until they have been elucidated. Dr. W. Rosenhain followed with an exposition of his hypothesis of "lattice structure," based upon Bragg's researches, which affords simple explanations of many phenomena exhibited by metals and alloys.

The Chemistry Section was fortunate in having as its president Prof. F. G. Donnan, F.R.S., who formerly occupied the chair of chemistry at Liverpool University. In his presidential address Professor Donnan gave an admirable and suggestive summary of recent work on molecular orientation in surface films. Dr. D. Coster sketched the results of recent investigations on high-frequency spectra. His colleague, Dr. von Hevesy, communicated a short paper on the chemistry of hafnium (celtium), demonstrating its much greater similarity to zirconium than to thorium. The subject of enzymes was discussed by Dr. E. F. Armstrong, and by Dr. K. G. Falk, of New York, whose paper was entitled "The Relation of Certain Enzyme Actions to Tissue Differentiation of Tumour Growth."

Of the papers read in other sections, that by Dr. S. Monckton Copeman, F.R.S., on Diet and Cancer aroused widespread interest. Dr. Copeman has investigated the effects of feeding adults on a dietary deficient in the fat-soluble vitamin A, and having found that the normal adult requires but very little of this accessory food factor, he fed cancer patients on a diet from which animal fats, with the exception of bacon and ham, which contain very little of it, butter, cream and eggs were excluded, the vitamin being supplied from vegetable sources, such as lettuce and watercress. The results were distinctly promising. Further, a study of the statistics relating to the inclosed and the uninclosed orders of the Roman Catholic Church showed that the members of the former, who are practically vegetarians, are much more free from cancer than those of the uninclosed orders.

NEXT YEAR'S MEETING IN CANADA

Further information is now available concerning the 1924 meeting to be held in Toronto, probably from Sept. 3 to 10. As the meeting of the American Association for the Advancement of Science has been arranged to be held at Buffalo, N. Y., in the week preceding Sept. 3 to 10, it is hoped that many of the English visitors will include it in their tour, and, reciprocally, that Americans will journey to Toronto after the close of their own meeting. The President-elect of the British Association for 1924-25 is Major-General Sir David Bruce, the well-known authority on tsetse-fly diseases, sleeping sickness and other tropical maladies.

Mechanical Separation

The Article Published Below Is an Advance in the Technology of This Unit Process and as Such Is of Significant Interest to Production Men in the Chemical Engineering Industries

Fine Screening Equipment—Its Selection and Operation

Unusual Considerations Concerning a Universal Problem—Value of Accurate Control in Plant

By F. S. Curtis
Engineering Department, W. S. Tyler Co., Cleveland, Ohio

SCREENING in its most usual application is well known as a means of grading or classifying materials according to particle size. For fine screening wire cloth is commonly used as a medium. If the screening medium does not move, a complete separation will occur only when the materials on the surface are distributed one particle deep. It is evident that when the layer of material exceeds one particle in depth, the particles will hinder one another in reaching the screening surface and that the large particles may prevent small particles, which would pass, from reaching a position where they would be measured and accepted.

Since the screening medium is only a device for measurement it is evident that continuous agitation of the material to be screened is required so that all particles may be brought in contact with the screening surface and given an opportunity to pass. To provide this agitation or sorting action is the purpose of screening machinery. It is evident that the machine which will in a unit of time bring the largest number of particles in contact with a unit area of screening surface is the most efficient one that can be employed.

Processes of manufacture and quality of materials used have been improved greatly in the hands of technical men, but for fine screening nothing has been found that can be satisfactorily substituted for the woven type. One reason for this is that in a woven screen a larger number of holes per unit of area can be obtained than in any other type of screening medium. The purchaser of screen cloth seldom stops to think that he is buying holes and that uniformity and number are the great essential. Production is often more important than durability.

Screening equipment, in addition to providing thorough sorting action, must also afford means for the rapid removal of oversize. Revolving screens and shaking screens accomplish this to a limited extent only, hence their replacement for many operations by improved types of the inclined vibratory screen. Inclining the screening surface until the oversize particles will "run" thins out the layer to be carried and provides some sorting action. Combining with this an intense, rapid vibration of a suitable character increases the rate at which the oversize particles travel and at the same time causes the finer particles to hug the screen until, if small enough, they pass through the openings as undersize.

Varying conditions must be met in screening operations. It is essential, therefore, that the screening equipment be provided with means for adjusting the screening angle and varying the vibration until the requirements as to separation and tonnage are worked out to the best advantage. From time to time screen renewals or changes in sizing are necessary, and for this reason it is important that the apparatus selected be so designed that the old surface can be quickly removed and a new one can be put in place without a troublesome delay.

There is much to be said in regard to screens and screening, particularly with reference to the use of testing sieves, which so far as we know are the only satisfactory measure of the performance of grinding equipment or screening equipment.

Control of screening operations is best effected through frequent sieve tests of representative samples. Specifications for separations and finished products are usually stated in "mesh." This is a mistake, for mesh, as used in connection with wire cloth and woven fabrics, refers only to the number of openings or wires per inch. If the specification is stated in fractions of an inch, the measurement becomes definite and dependable.

In the past, the screening operation has been looked on in many manufacturing processes as the "neck of the bottle." This is no longer the case. The use of a screen in closed circuit with grinding equipment has in some instances more than doubled the output of the grinder without increasing the power requirement. In certain operations by putting a screen ahead of the fine grinder so as to limit the size of the particles delivered to it, the tonnage has been increased and at the same time a product having a better fineness specification has been obtained.

A 1-in. cube in passing through a screen of that opening travels 1 in. plus the thickness of the screen. A billion cubes of 0.001 in. (a 1-in. cube split into 0.001-in. cubes) cumulatively travel in passing through the screen a billion times the thickness of the screen plus something more than 15 miles. This throws some light on difficulties that are met in screening exceedingly fine materials.

Centrifugal Separation

Unloading the Centrifugal

By Bruno C. Lechler
Mechanical Engineer, Fletcher Works, Philadelphia, Pa.

The usual method of drying chemicals in a centrifugal is to charge the material into the basket while the machine is stopped, or revolving very slowly. It is then brought to speed and run for such length of time as has been found necessary to secure the desired results. The machine is then stopped and the material removed.

Attempts have been made to design centrifugals for continuous operation. Numerous patents have been taken out and much money has been spent in developing and exploiting such apparatus, but the fact that no automatic centrifugals have come into general use shows that these efforts have been unsuccessful. The reason is not difficult to find. In centrifugal baskets, running at the usual speeds, each pound of material presses outward against the inside of the basket with a force of from 200 to 800 lb., depending on the size of the machine and the speed. Suppose we have a charge of 500 lb., a centrifugal effect of 800 times gravity and the material has a coefficient of friction of ½. To keep the material in the basket in continual motion we have to overcome a resistance of $800 \times 500 \times \frac{1}{2} = 200{,}000$ lb. While it is possible, of course, to construct a machine strong enough to overcome the resistance of the material, sliding the material over the screen or filter cloth, while under the heavy pressure due to centrifugal force, has a very destructive scouring action on the screens and tends to pulverize the material and force it through the screen.

Another method is to apply a program device to a centrifugal by means of which the machine is automatically charged, speeded up, stopped and emptied, the cycle being repeated at timed intervals.

Mechanical Unloaders

A method which appears to have a much wider application is the use of a mechanical device which will unload the machine while it is in motion. Due to the centrifugal force created by the high speed, the material packs very firmly and considerable labor is required to break up the cake. If we attempt to provide a mechanical scraper, we find certain practical difficulties. The resistance of the scraper will cause the machine to gyrate; the space available is limited, and we must be cautious to avoid interferences. If our scraper does not touch the lining, it will not clean the screen; if it bears too heavily, it will tear the screen.

So the design of a proper unloader becomes a nice balance of factors. As the balance is different for different materials, so the unloader will vary, depending on whether the material is light and easily removed, or is tightly packed. In the former case, the important thing is to have an unloader that is easy of operation; in the latter, one that is very rugged and in which the stresses are carefully balanced.

One of the problems in the centrifugal drying of bulky materials is the discharge of the solids. A machine that would do away with intermittent operation would be an ideal solution for this difficulty. Many have experimented in this direction and although definite progress is being made, the continuous centrifugal is not as yet of wide industrial application. The next best resort appears to be the mechanical unloader, intermittently operated. In this article is described a device that has been used successfully with ammonium sulphate and will doubtless find other applications in the chemical engineering industries.

A light type of unloader is used for loosely packed crystals. For the heavier materials, a much heavier plow is needed, and in order to lift such a heavy plow, a rack and pinion are needed.

A Heavy-Duty Discharger

Fig. 1 shows an ammonium sulphate unloader in use. This is intended for machines of the type in which the curb is set down into the floor. Attached to the curb top, which is but a few inches above the floor, is a vertical post carrying for part of its length a rack.

Sliding on this post is a sleeve, moved by a handwheel and pinion, which in turn carries the main arm of the plow. This is a kneeshaped steel casting, which also slides on the vertical post and swings about it. This carries a vertical bronze arm, which reaches down into the curb and carries at its lower end the scraper. The proportions of this arm and scraper are such that the pressure of the scraper on the lining is kept within very close bounds. The position of the arm is controlled by the handle and a latch which engages an adjustable stop plate as shown.

When not in use the unloader arm rests on top of the curb. As the hand wheel elevates the unloader plow, the hand swings it toward the center of the basket. The handwheel now allows it to sink down until it is below the rim of the basket. The unloader is then swung back, into the material, the latch engaging another notch, so placed as to allow the plow to remove most of the wall, but not to touch the sides. When the bottom of the basket is reached, the stop lock is released, and the unloader arm, against which there is now little pressure, scrapes the sides clean. It will be noted that in this type of unloader the material in the basket does not come in contact with the rack or the operator's hands—quite an item when acid material is handled.

Although unloaders are not applicable to all materials, where they can be used they greatly reduce the physical exertion required to unload, reduce labor costs and frequently give a better product. This results from the habit of workers, when unloading by hand, of not fully drying the material to make it easier to unload. With the unloader a drier product, less apt to deterioration, is obtained.

FIG. 1—A TYPE OF UNLOADER USED FOR AMMONIUM SULPHATE

Equipment News

From Maker and User

Dry Pulverizing With Air-Swept Tube Mills

The accompanying photograph illustrates equipment which was installed in conjunction with a crushing plant for pulverizing limestone. It consists of an elevator for delivering the material to a tower drier, and from the tower drier it is elevated to a bin, from which it is fed by a regulating disk feeder to a 6x12-ft. air-swept tube mill. The material is extracted from the mill by a 60-in. fan and delivered through cyclones to the storage bins.

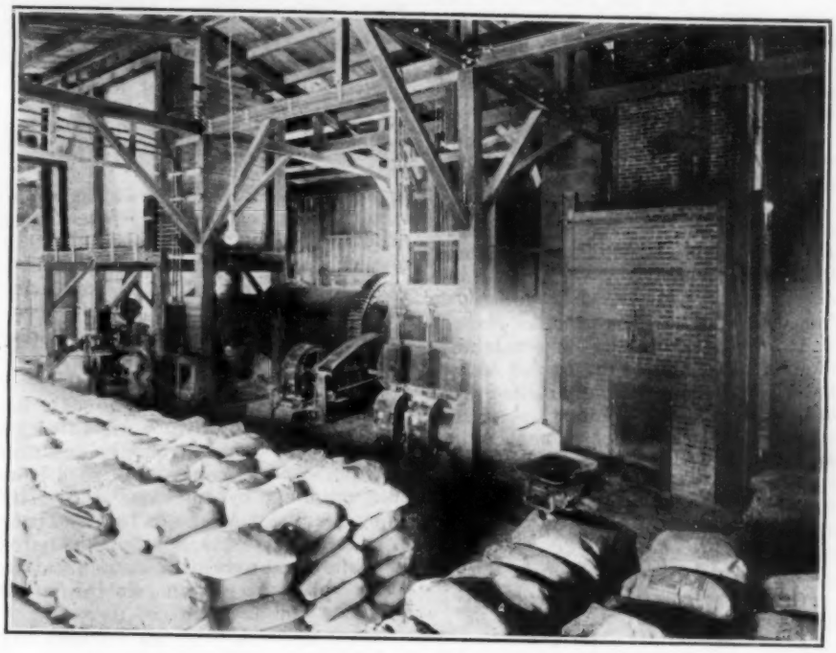
Among the features of the plant are the tower drier, which consists of a system of baffling and requires no power to operate it, and the air-swept tube mill, which is an innovation in the reduction of materials in that it has no discharge lifters and no means of extracting the material except the velocity of the air through the mill. It is equipped with an air box at the feed end and one at the discharge end. These boxes have valves on both sides so that the quantity of air delivered at the feed end and taken out at the discharge end regulates absolutely the fineness of the product discharged. The valves on the air box at the discharge end of the mill can be regulated so that the elevating power of the fan is maintained for lifting the material through the cyclones to the bin.

It is claimed that in this way a greater percentage of superfine impalpable powder is obtained from a tube mill than heretofore. This is evidenced by the sifting test, which is as follows: 84½ per cent through 200 mesh; second cyclone all passing a 350-mesh sieve.

When this plant was installed the intention was to produce agricultural lime, 20 mesh and finer. The manufacturers recommended the installation of a double cyclone system for the production of a superfine product which would command a fancy price for dusting on belts and roofing paper to keep it from sticking together before rolling, asphalt filler and other material.

When the plant was started the spring crops had been planted and there was no demand for agricultural lime. By reducing the fan speed and the velocity of the air through the mill, nothing but superfine material was taken out of the mill and a new record was established for three things: Horse power, tonnage and fineness.

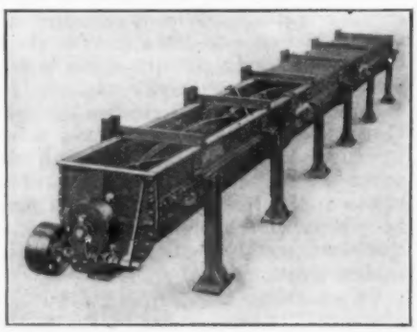
The mill is driven by a 125-hp. motor, direct connected through a silent chain drive and clutch coupling, and the 60-in. fan is driven by a 25-hp. variable speed motor direct connected to the fan by flexible coupling. The electric company furnishing the power determined that the input to the tube mill motor was 120 hp., the input to the fan motor was 12 hp. and the total power consumption for driving the mill and fan was 132 hp. This equipment is manufactured by the Kennedy-Van Saun Manufacturing & Engineering Corporation, 50 Church St., New York, N. Y.



AIR-SWEPT TUBE MILL AND OTHER EQUIPMENT FOR PULVERIZING LIME

Crystallization by Continuous Process

Generally each attempt to change from the batch method of operation to the continuous method marks a step in advance, and we believe that the Swenson-Walker continuous crystallizer, which has been placed on the general market during the past few months, is such a step. In addition to this equipment giving continuous operation, its manufacturers, the Swenson Evaporator Co., Harvey, Ill., claim that it affords real control of crystal size.



SWENSON-WALKER CONTINUOUS CRYSTALLIZER, SINGLE DECK, THREE STANDARD SECTIONS

The continuous crystallizer consists of a sheet metal jacketed shell containing a conveyor agitator. The conveyor agitator is a long pitch screw similar to a ribbon conveyor, and serves to prevent adherence of crystals to the cooling surfaces, as well as to carry the mixture of crystals and mother liquor through the machine.

The shell and agitators are in standard 10-ft. sections, providing an easy means of increasing the size of the machines. The crystallizer is made with from one to three decks as the capacity and floor space require. Each deck is provided with a separate drive, all to be belted to a countershaft and driven by one motor. Covers are provided of either solid metal or wire construction.

Structural steel supporting columns, gear guards, intermediate piping between sections and decks, grease cups and other small accessories are supplied to make each unit complete within itself.

A constant and uniform flow of hot saturated solution is fed to the receiving end of the top deck. By means of the conveyor agitator, the liquor and forming crystals are conveyed the length of the deck and discharged through a trough to the next deck. The

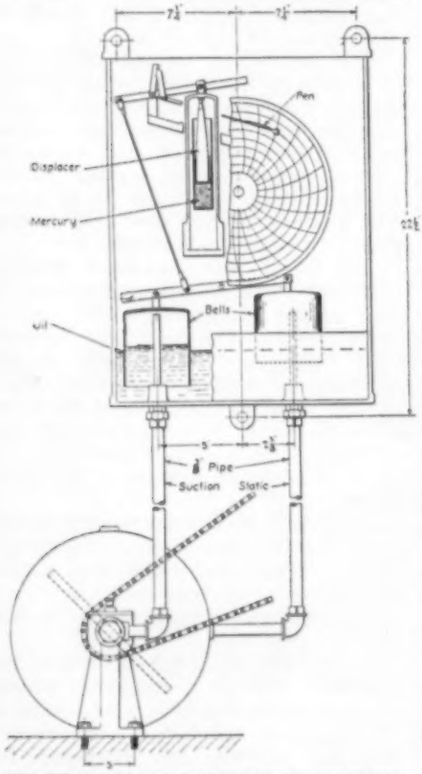
cooling medium (water or brine) is fed into the jacket at the lower end of the machine where the mother liquor and crystals are discharged. This cooling water or brine travels through the jacket counter-current to the liquor flow in the shell, and is discharged from the jacket at the point where the saturated solution enters. The liquor coming in contact with the jacketed surface of the shell is cooled and the crystals form. These crystals are conveyed along with the mother liquor, growing in size until the mixture of mother liquor and crystals is discharged from the machine. This arrangement allows easy and accurate control of liquor feed and cooling medium.

By controlling the liquor feed, the cooling medium and the time required for the crystals and liquor to pass through the machine, the size of crystal formed may be increased or decreased. This makes it possible to make several grades or sizes with the same machine. The ability to control the size of output enables the maker to guarantee uniformity of product.

Among the substances now being crystallized with this equipment are trisodium phosphate, diosodium phosphate, glaubers salt, copperas, epsom salt, hypo and sodium nitrate.

Recording and Indicating Rotation Speed

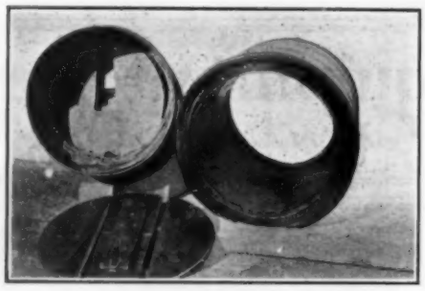
The need for an accurate and reliable tachometer which may be located at a considerable distance from the rotating machine is felt in many plants, such as those using paper machines, centrifugal pumps, fans and blowers, and other apparatus where speed of rotation is an index of output. As a means of filling this need the Bailey Meter Co., Cleveland, Ohio, is offering its recording and indicating tachometers.



DIAGRAMMATIC LAYOUT OF BAILEY RECORDING TACHOMETER

This tachometer is actuated by the suction created by the centrifugal force of a column of air in a tube rotating about its center. The construction consists of a tube mounted in bearings and driven from the rotating machine either directly through a suitable coupling, by sprockets and chain or by gearing. At the end of this tube is a hollow crosspiece making a letter T. Rotation produces a suction due to centrifugal force tending to throw the air out of the arms of the tee.

There is no flow of air through the system, but simply a suction produced which is applied to the inside of an oil-sealed bell, which in turn actuates an indicating or recording device. The accompanying diagram shows how the recording instrument works.



KNAPP KNOCK-DOWN BARRELS

Taken apart for return shipment—seven sheets nested, and the eighth barrel containing the heads and wires from seven barrels.

Container Useful for Shipping Chemicals

A metal barrel that can be knocked down and nested for return and can be set up when needed again fills a special need for the shipper of chemicals. Because this container can be returned in knock-down form, it saves in freight and occupies much less storage space.

The principal feature of the barrel is the locking barrel head, which permits inserting or removing the head of a barrel in the croze without expanding the croze of the barrel. The barrel is made of a thin sheet of black iron or galvanized iron according to the product it is to contain. The sheet of metal is fastened with wires which are quickly and easily detachable. When the barrels have reached destination they can be quickly knocked down by cutting or opening the small tie wires holding the wire hoops. The heads and wires of seven barrels may be placed in the eighth barrel, while the seven metal sheets are nested for return shipment.

To assemble, the forms are put on a mandrel the exact size of the inside of the barrel. Clamps close the sheet in place, the joint is made, wire hoops are put on and the head is put in place. The manufacturer is the Knapp Metal Barrel & Package Co., San Francisco, Calif.

Additional Models in the Industrial Truck Field

Recently announced additions to the available models of industrial trucks and tractors are the type TT-23 and the type GEL, manufactured by the Crescent Truck Co., Lebanon, Pa.

Type TT-23 is a four-wheel tractor, designed for heavier work than the three-wheel tractor which this concern has marketed for a number of years. Type GEL is a low lift platform truck, with a platform 11¾ in. high when lowered and a lift of 4½ in. The marketing of this model serves to complete the Crescent company's line of general utility industrial trucks.

Catalogs Received

WILLSON GOGGLES, INC., Reading, Pa.—A catalog describing the Willson line of safety goggles, respirators, welding helmets and hand-shields.

AUTOMATIC & ELECTRIC FURNACES, LTD., 173 Farringdon Road, E. C. 1, London, England. A booklet, describing the Wild-Barfield electric furnaces for the heat-treating of high-speed steel. Also a booklet, describing the radiant heat type of electric furnace with internal heaters, of the Wild-Barfield design.

MITCHELL-RAND MFG. CO., 18 Vesey St., New York City—Catalog 423. A catalog entitled "Everything in Insulation." This catalog describes all the various types of organic and inorganic iron insulations that are manufactured or marketed by this concern.

CORNING GLASS WORKS, Corning, N. Y.—A new pamphlet on Pyrex industrial ware, which describes the various applications of Pyrex glass in chemical and similar plants.

UEHLING INSTRUMENT CO., Paterson, N. J.—Bulletin 116A. A booklet, entitled "Sampling Line for Flue Gas Analysis." This bulletin describes the various items of equipment manufactured by this concern for the purpose of conditioning flue gas before taking CO_2 measurements on it.

ESTERLINE-ANGUS CO., Indianapolis, Ind.—Bulletin 923. A bulletin describing the use of graphic instruments in electric power stations.

MOORE STEAM TURBINE CORP., Wellsville, N. Y.—A catalog made up of the numerous bulletins issued by this concern in recent months on the subject of steam turbines of various types and for various purposes.

GEORGE D. WETHERILL & CO., Philadelphia, Pa.—A booklet entitled "Paint the Medicine of the Future," describing the use of painted walls in industrial and other types of buildings.

BRISTOL CO., Waterbury, Conn.—Bulletin 317. A bulletin describing the various types of recording and indicating tachometers which the Bristol Co. makes.

FOXBORO CO., INC., Foxboro, Mass.—Bulletin 82-2. A bulletin describing recording and indicating liquid level gages of various types and for various purposes.

CRYSTEEL WORKS, 847 W. Jackson Blvd., Chicago, Ill.—A booklet entitled "Crysteel, How and Where." This booklet describes the art of applying porcelain enamel to steel and the manufacture of various kinds of industrial and domestic ware.

MERCURY MFG. CO., Chicago, Ill.—Bulletin 106. A bulletin describing the new Mercury Type H industrial tractor.

ROLLER-SMITH CO., Bethlehem, Pa.—Bulletin 450. A new bulletin on the various types of switchboard instruments for alternating current which this company produces. Bulletin 560—A bulletin describing the Roller-Smith Safety Circuit Breaker, Types P and E.

DENVER FIRE CLAY CO., Denver, Colo.—Catalog 10. A new issue of this company's general catalog in which a full description is given of the various kinds of assayers' and chemists' supplies, scientific apparatus, chemicals and refractories carried in stock by this concern.

Readers' Views and Comments

An Open Forum for Subscribers

The editors invite discussion of articles and editorials or other topics of interest

A Request for Plant Photographs

To the Editor of Chem. & Met.:

SIR—May I take the liberty of requesting your assistance in the following matter? I have in preparation a second edition of my handbook comprising statistical, economic, commercial and technical data on the raw materials and manufacturing operations connected with the chemical and allied industries of the world. Because of its international character, I should like to include in this edition a limited number of illustrations covering those chemical or allied industries which are pre-eminent in or characteristic of the various countries.

Accordingly I would appreciate it if you would place before your readers a request that such photographs (or cuts, if 4x3½ in. or 7x4 in.) as may be available for this purpose be sent to me at Landhausstr. 9, Berlin-Wilmersdorf, Germany. DR. W. A. DYES.

Alaskan Opportunities for Pulp and Paper Industry

To the Editor of Chem. & Met.:

SIR—In your issue of June 11 there appeared an editorial headed "Curious Ideas of Conservation," most of which is admirable. The second paragraph, however, repeats a rumor which is so grave a misstatement of facts as to make it more surprising to find it repeated in a journal of your standing. This paragraph is as follows:

"It is reported that on the Canadian side of the imaginary line that separates Alaska from the dominion there is a large and thriving paper and pulp industry. For the most part it is in the hands of Americans who were forced out of Alaska by the peculiar conception of conservation that seems to have as its objective that there be no development anywhere—that water capable of developing power should continue to waste itself on the rocks of its stream bed and that trees should continue to grow to maturity and then fall down to rot and ruin."

There is a fairly thriving pulp and paper industry in British Columbia, which is a logical extension of the similar industry in the states of Washington and Oregon. There is also the beginning of a pulp industry in Alaska which is the logical extension of the industry across the line from British Columbia. But the statement that the pulp and paper industry in British Columbia is in the hands of Americans who were forced out of Alaska by the government's policy with respect to either water power or timber is untrue. It is untrue even if the literal sense of "forced out" is disregarded and the phrase taken to mean that American capital desired to locate pulp and paper mills in Alaska, but was forced to establish its industry in British Columbia instead.

The rumor seems to have reference to two large pulp and paper mills in British Columbia directly controlled by American capital. One of these (the Pacific Mills Co., Ltd., of Ocean Falls, B. C., controlled by the Crown Willamette Paper Co.) was started by British capitalists who constructed the plant but were unable to operate it successfully. American capitalists then bought the plant for only a fraction of its original cost, and by making certain modifications and by scaling down the capital charge have operated it successfully. Information obtained directly from a representative of this American company who is fully informed in regard to the transfer is that the present American company had never considered locating in Alaska, and would not have gone there. The attraction that induced it to locate in British Columbia was the opportunity to secure an expensive plant at a very low price.

The second plant is that of the Powell River Co., Ltd., which from the time the plant was built has been controlled by the Brooks-Scanlon Lumber Co. of Minneapolis, Minn. D. F. Brooks, president of the latter company, states: "No consideration, at the time the plant was established, was given alternative locations. . . . No consideration was given to Alaskan opportunities, as we knew little about that country at that time." The Powell River plant was built in 1911.

False rumors such as the one referred to in your editorial were in a large measure responsible for the personal investigation of conditions in Alaska conducted by President Harding during the past summer. You are probably familiar with the speech he delivered at Seattle upon his return, in which he pointed out the entire reasonableness of the terms on which pulp and paper manufacturers are offered the opportunity to develop water power and to purchase timber in Alaska. The law under which the Federal Power Commission issues licenses for the development of power is liberal and is certainly regarded as satisfactory by those who are investing hundreds of millions of dollars in development work under its terms in the United States, including projects now being undertaken in Alaska. In regard to the opportunity to secure timber for manufacture into pulpwood, President Harding, after stating that, previous to visiting Alaska, he had felt that the conditions of contract might need modification, said: "I venture with some knowledge of conditions in various paper-making countries to state that no better contract, indeed none so good, can be secured in any of them."

In calling this matter to your attention I have been actuated by the belief that you would welcome a plain statement of the facts to replace the misinformation so widely circulated in regard to the opportunities for the establishment of the pulp and paper industry in Alaska.

E. A. SHERMAN,
Acting Forester.

Forest Service,
U. S. Department of Agriculture,
Washington, D. C.

Activated Carbon

To the Editor of Chem. & Met.:

SIR—Dr. A. B. Ray, in his paper on "Activated Carbon" (*Chem. & Met.*, Aug. 27, 1923), quotes the results obtained by A. L. Davis (*Ind. Eng. Chem.*, 1923, vol. 15, pp. 631-2), in which comparative recoveries of butanol, ethanol and acetone were made, using cresol and activated carbon, and the conclusion drawn was that the former was 89.4 per cent as efficient as the latter.

These tests were made by the Bregeat Corporation of America and reported by Mr. Davis. Since they were merely designed to show the comparative adsorptions of the two adsorbents under empirical conditions, they should not be used to evaluate the comparative efficiencies of the two adsorbents when used in apparatus designed to be proper for their specific advantages. Activated carbon was used in the above tests only as a means of analytical control, for which purpose it is quite excellent, as it will absorb all the solvents from a gas until its break point is reached, which latter is a relatively sharp end point. But the use of carbon in an analytical way is essentially a batch process, just as is its industrial application. In the case of cresol, however, the efficient method of operation is a continuous flow process, it being liquid and amenable to such treatment, whereas activated carbon cannot be conveyed and must remain in a fixed location. Practically complete absorption in cresol can be realized by the correct application of the countercurrent principle and proper design of absorber. This is the important point—namely, not the efficiency of cresol as an analytical method but what it will actually accomplish in plant practice in properly designed apparatus. Even if activated carbon possesses a higher adsorption capacity than cresol, as a manufacturing accessory such a quality does not by any means predicate economic superiority. By this explanation we desire to clarify any misunderstanding of the quoted article by Mr. Davis.

All of the above considerations apply also to the German paper quoted by Dr. A. B. Ray (*Z. angew. Chem.*, 1922, vol. 35, pp. 189-92), but the conclusions of the German author are altogether surprising in view of the steadily in-

creasing use in Germany of the French cresol process. Obviously, the German author overlooks the fact that the superiority of a commercial process resides in the financial balance sheet and not in the mere feature of concentration obtainable. This inevitable law is well illustrated by the fate of the sulphuric acid process for the recovery of ether and alcohol from lean gases—the much higher concentration obtainable in sulphuric acid did not prevent the wholesale scrapping of solvent recovery plants using this absorbent in England, France and Spain, in order to make room for the cresol process, which has been officially adopted by the respective governments after exhaustive studies such as governments rarely devote to their industrial problems.

M. ROULLEUX.
Bregeat Corporation of America,
New York City.

Fundamental Ethics of Technical Journalism

To the Editor of Chem. & Met.:

SIR—I have read with considerable interest your editorial "Fundamental Ethics of Technical Journalism" in the issue of July 23, and am in hearty accord with the sentiments expressed therein.

On Aug. 27, 1903, I published in the *Iron Age* a new method of fluorspar analysis, which has proved valuable in the evaluation of this flux.

It was incorporated in "Practical Methods for the Iron and Steel Works Chemist," page 39, by J. K. Heess, chief chemist, Carnegie Steel Co., Sharon, Pa., and due credit given me. In a similar book recently published entitled "Technical Methods of Steel and Steel Works Material," written by Frank T. Sisco, it was incorporated also, page 448, but no credit was given me. He designated my method as the "fusion method," although the distinctive feature is that the fusion is preceded by decomposition by concentrated sulphuric acid and that silica is not volatilized, but can be determined directly.

Since no material benefit has accrued to me, it would not seem asking too much if a successful method was named after its author as honorary compensation.

ERIC JOHN ERICSON.
Standard Forgings Co.,
Indiana Harbor, Ind.,
E. Chicago Station.

Review of Recent Patents

Mechanical Salt Cake Furnace

Stepped Hearth With Scrapers Sweeping in Overlapping Circles Makes the Rabble Arms Self-Clearing and Insures Thorough Mixing of the Reacting Mass

VARIOUS types of mechanical furnaces have been proposed heretofore for the manufacture of salt cake and muriatic acid, but have not proved highly satisfactory in practice. The principal difficulties encountered result from the characteristics and behavior of the raw materials and the resultant reaction mixture to be handled; and although these difficulties are most pronounced when the reagents employed are sulphuric acid and common salt, they are also experienced to a certain extent when niter cake (acid sodium sulphate) and salt are employed as starting materials.

In reacting between common salt and sulphuric acid, it is important that the salt be in sufficiently finely divided condition to insure efficient reacting contact of the acid therewith; but on the other hand, the salt should not be too fine, because too rapid an attack of the acid would thereby be induced, resulting in excessive foaming and balling up of the mixture. Under the most favorable conditions there is more or less tendency to balling up, that is, to formation of a coating over parts of the charge and cementing of these parts into balls which are only slowly penetrable by the acid. Where the salt particles are, say, approximately ¼ in. in diameter, the reaction can be carried out most effectively. In practice, it is desirable first to form a soup-like mixture of the acid and salt or, as it is often expressed in practice, the salt should be dissolved in the acid charged. It has been found most satisfactory to use sulphuric acid, known as "tower stock," which is 60 deg. Bé. or 1.72 specific gravity with an acidity of approximately 77½ per cent H_2SO_4 rather than to use stronger grades of acid. The action of this acid on the salt is sufficiently sluggish to permit the salt to "dissolve" in it. When salt and acid are mixed together, they form a liquid mass at ordinary temperatures, and the reaction between the two starts immediately with the evolution of hydrochloric acid gas mixed with some water vapor. Heat must be applied to keep the reaction going; and as more and more gases are evolved, the mass tends to thicken up and become difficult to rabble because it is neither wet nor dry but in a pasty semi-viscous condition. As the heating is continued, hydrochloric acid gas and water are evolved until the residue tends to reach an almost dry state at a black-red temperature of from 400 to 500 deg. C. The longer the time allowed for the calcination and the more intimately the reagents are mixed together the less is the necessity for a high finishing temperature; but if the mixing cannot be thoroughly effected, or if a relatively long period of time cannot be allowed for heating, a high finishing temperature must be used. Moreover, local overheating of even relatively dry material in this process results in fusion, which in turn causes scouring or fluxing of the hearth refractories, besides other troubles to be referred to hereinafter. The foregoing practical considerations impose certain conditions and requirements which mechanical furnaces heretofore proposed have failed to meet satisfactorily.

The sticky and viscous character of the reaction mass during a considerable part of its progress over the calcining hearth renders it particularly difficult to handle and any rabbling mechanism should be capable of freeing itself automatically from adherent masses of the viscous material. Such a construction is embodied in a furnace designed by Lewis B. Skinner, of Denver, Colo. It is of the muffle type with highly conductive refractories such as carborundum in the muffle roof so that most of the heating is through the roof and not through the hearth. The latter consists of a mixing pot or pan with a substantially plane bottom inclined upward to a discharge lip or rim and a finishing hearth comprising a series of steps in descending succession toward a discharge opening. Both the pan and finishing hearth are provided with revolving rabbles, those on the hearth sweeping circles each of which is above two sections of the hearth at different levels, so that during half its travel a rabble arm is scraping one hearth, while during the remainder of the revolution it is suspended over the next lower hearth. Alternate rabbles revolve in opposite directions.

In operating the furnace, salt and sulphuric acid are fed to the mixing pan in proper reacting proportions and at a suitable rate of speed. The resultant soupy mixture or "solution" of salt in acid is thoroughly agitated and stirred by the rabble device provided for the mixing pan; and as portions of the reaction mixture thicken up and become semi-solid, these portions are advanced up the inclined bottom of the mixing pan by the action of the rabble teeth and are brought within the range of action of the second rabble device, which transfers the material from the lip of the mixing pan to the upper end of the finishing or calcining hearth. At this stage the mixture contains large proportions of acid sodium sulphate and salt, and at the temperature prevailing in this part of the furnace is a semi-fluid viscous mass. This material is worked by the rabble mechanism into effective range of the third rabble device, by the third to the fourth and so on down the series, the alternating reversals in direction of rabble arm movement being very effective to agitate thoroughly and break up the material as it is advanced

Moreover as each arm with its attached rabble teeth swings out over the next succeeding hearth step or terrace, any viscous and semi-fluid material sticking thereto has an opportunity to flow down and hang below the rabble teeth; and as the slowly revolving arm swings back over the hearth step or section next above, those portions of the material sticking to the rabble teeth and hanging below them are sheared off and in this way dropped down upon the lower hearth step, from which they are then transferred to the next succeeding step or terrace by the action of the rabble arm next in series. As the material is advanced down the succession of hearth steps, it gradually dries out owing to the completion of the reaction between sodium acid sulphate and sodium chloride, which results in evolution of hydrochloric acid gas and the production of salt cake or sodium sulphate, which is a much drier material and is easier to handle. The long inclined finishing hearth gives ample opportunity for prolonged exposure of the reacting materials to calcining heat, and the action of the described arrangement of rabbling mechanism, especially in conjunction with the stepped or terraced hearth formation, produces salt cake substantially free of sodium chloride and acid sodium sulphate, the salt cake being discharged through a discharge opening at the lower end of the furnace. The hydrochloric acid gas evolved passes out through an offtake and thence to a suitable absorption train, in accordance with the usual procedure for obtaining solutions of commercial strength. No change is required in this part of the system. (1,467,509; Sept. 11, 1923.)

Books Received

How to Use Fuel Oil

FUEL OIL IN INDUSTRY. By *Stephen O. Andros.* Second edition, 200 pp., illustrated. Fort Wayne, Ind.: Petroleum Extension University. Price, $3.75.

In this revised edition, all subject matter has been eliminated which does not have a direct bearing on the economical purchase, storage and application of fuel oil for all types of boilers as well as other uses in the iron and steel, sugar, glass, ceramic and gas industries.

Japanese Business Directory

THE JAPAN BUSINESS DIRECTORY FOR 1923. By *S. H. Sommerton, Eastern Commerce,* Yokohama, Japan. 1,085 pages. Price, $7.50.

All firms having business relations with Japan will welcome the appearance of this directory, which has been compiled by *Eastern Commerce,* a monthly trade journal of the Far East. It is the first directory of its kind ever published in Japan and some idea of the effort involved may be gained from the size of the volume, comprising over 1,000 pages. The data are presented by industrial districts, such as Tokyo, Osaka, Kobe, Yokohama, as well as the less important cities and Hokkaido, Chosen, Formosa and South Manchuria. Under each district, the bulk of the information consists of an alphabetical listing of firms in good financial standing (with addresses, telephone numbers, type of business and representatives' names) and classified lists subdivided into manufacturers, dealers, importers, exporters and miscellaneous. In addition, there is information on government departments, Japanese banks, foreign embassies, foreign business firms and foreign residents.

A limited number of copies of the directory are available through the World Wide News Association, 303 Fifth Ave., New York, the American representatives.

Calendar

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, seventy-fifth anniversary meeting, University of Cincinnati, Cincinnati, Ohio, Dec. 27 to Jan. 2.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, winter meeting, Washington, D. C., Dec. 5 to 8.

AMERICAN MANAGEMENT ASSOCIATION, Hotel Astor, New York, Oct. 29-31.

AMERICAN PETROLEUM INSTITUTE, fourth annual meeting, Statler Hotel, St. Louis, Mo., Dec. 11 to 13.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, annual meeting, New York City, Dec. 3 to 6.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, annual convention, New York City, Dec. 3 to 5.

AMERICAN WELDING SOCIETY, fall meeting, Pittsburgh, Pa., Oct. 24 to 26.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATION ENGINEERS, fourteenth annual convention, Memphis, Tenn., Dec. 12 to 16.

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING, Grand Central Palace, New York, Dec. 3 to 8.

SOCIETY OF AUTOMOTIVE ENGINEERS, annual meeting, simultaneously with the Detroit Automobile Show, General Motors Bldg., Detroit, Mich., Jan. 22 to 25, 1924.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Appleton, Wis., Oct. 25 to 27.

American Patents Issued October 9, 1923

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,469,804 — Liquid - Treating System. Joseph F. Musselman, Bronxville, N. Y., assignor to Anti-Corrosion Engineering Co., New York.

1,469,805—Heat Exchanger. Joseph F. Musselman, Bronxville, N. Y., assignor to Anti-Corrosion Engineering Co., New York.

1,469,824—Process of Preparing Alkali Cellulose. Paul C. Steel, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester.

1,469,871—Pressure Regulator. Joseph Wallace Allen, Clairton, Pa.

1,469,877—Disintegrator. Joseph Klee Blum, Greenburg, N. Y., assignor to K.-B. Pulverizer Co., New York.

1,469,895 — Method of Preventing Transmigration of Vulcanizing Agent in Rubber. John Parks Coe, Hastings-on-Hudson, N. Y., assignor to Morgan & Wright.

1,469,958—Apparatus for and Method of Recovering Waste Gases. George A. Richter, Berlin, N. H., assignor to Brown Co., Berlin.

1,469,959—Cooling and Absorbing System for Sulphur Dioxide. George A. Richter and Gordon E. Wightman, Berlin, N. H., assignors to Brown Co., Berlin.

1,469,960—Process of Treating Black Liquor Produced in the Manufacture of Sulphate Pulp. George A. Richter and Douglas H. McMurtrie, Berlin, N. H., assignors to Brown Co., Berlin.

1,469,976—Dry Kiln. Joseph Patrick Walsh, Vancouver, B. C., Canada.

1,469,993—Method of and Apparatus for Adding Moisture to Powdered Materials. Willis H. Carrier, New York, N. Y., assignor to Carrier Engineering Corp., New York.

1,470,027—Method and Apparatus for Absorbing Radium Emanation. Harry B. Palmer, Morristown, N. J.

1,470,039—Process of Making 2-3 Oxy-Naphthoic Acid. Roger N. Wallach, New York, N. Y., assignor to Grasselli Chemical Co.

1,470,073 — Method and Composition for Treating Fibrous Material. William C. Geer and John B. Dickson, Akron, Ohio, assignors to B. F. Goodrich Co., New York.

1,470,084 — Method of Deoxidizing Water. Richard G. Knowland, Boston, Mass.

1,470,116—Apparatus and Process for Condensing Casinghead Gas and the Like. George E. Gray, Compton, Calif.

1,470,175—Refractory Metal Product and Process of Making the Same. Clemens A. Laise, Weehawken, N. J.

1,470,225—Removal of Scale and Rust From Iron and Steel. Harry N. Holmes, Oberlin, Ohio.

1,470,228—Rendering Process. Joseph Lister, deceased, late of Chicago, Ill.; by Edwin Lister, executor, Chicago.

1,470,260—Hardened Water-Repellent Gypsum Plaster and Method for Producing the Same. Joseph W. Emerson, Salida, Colo.

1,470,300 — Process of Graphitizing Preformed Carbon Bodies. Emerich Szarvasy, Budapest, Hungary.

1,470,306—Art of and Apparatus for Drying Materials. Joseph H. Walsh, Reading, Mass., assignor to Johns-Manville, Inc., New York.

1,470,336 — Carbon-Monoxide Burner. Alfred F. Tardie, Riverside, R. I.

1,470,353—Apparatus for Treating Oil. Gustav Egloff and Harry P. Benner, Independence, Kan., assignors to Universal Oil Products Co., Chicago.

1,470,359—Process of Removing Carbon From Metal Pipes. Charles J. Greenstreet, St. Louis, Mo., assignor to Gasolene Corp.

1,470,461—Means for Vaporizing Liquid Fuel. James M. McClean, Vancouver, B. C., Canada.

1,470,531—Apparatus for Classifying Granular Materials. Martin Hokanson, Duluth, Minn.

1,470,552 — Catalyst and Method of Making Same. Horace G. Byers, Montclair, N. J. assignor to Brown Co., Berlin, N. H.

1,470,554-5—Dyestuff Prepared From Orthoxylylaldehyde. Augustus Edward Craver, Buffalo, N. Y., assignor to Barrett Co.

1,470,556—Process of Bleaching Cellulosic Material. Elwood Ebie and George A. Richter, Berlin, N. H., assignors to Brown Co., Berlin.

1,470,577—Reinforced Platinum Anode for Production of Persalts. Otto Liebknecht, Frankfort - on - the - Main, Germany, assignor to Roessler & Hasslacher Chemical Co., New York.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Men in the Profession

Dr. GEORGE FALES BAKER of Philadelphia has been elected president of the Pennsylvania Salt Co., filling the vacancy caused by the recent death of Arthur E. Rice. LEONARD T. BEALE, of the John T. Lewis & Brothers Co., Philadelphia, manufacturer of paints, etc., has been elected a director.

JOHN L. BRAY has resigned his position as metallurgist with the U. S. Tariff Commission to accept the professorship in metallurgy at Purdue University, Lafayette, Ind.

Dr. G. K. BURGESS, director of the Bureau of Standards of the Department of Commerce, discussed the work of his organization in an address on Oct. 17 before the Washington Society of Engineers.

MORTIMER E. COOLEY, dean of the College of Engineering and Architecture of the University of Michigan, has resigned as president of the American Engineering Council of the Federated American Engineering Societies. Dean Cooley, in presenting his resignation to the executive board, said that he retires on account of ill health. He also made it known that he has been granted leave of absence by the University of Michigan for the second half of the academic year 1923-24. Dean Cooley's successor will be formally chosen at the annual meeting of the American Engineering Council to be held in Washington, D. C., early in January.

H. M. COX, formerly metallurgist with the E. G. Budd Manufacturing Co. of Philadelphia, is now with the Central Steel Co., Massillon, Ohio, in the same capacity.

Dr. F. B. DAINS of the chemistry department, University of Kansas, has just returned from a summer of travel in southern Europe.

Dr. ARTHUR L. DAY, director, Geophysical Laboratory and chairman of the advisory committee in seismology, Carnegie Institute, Washington, D. C., spoke before the Franklin Institute of the State of Pennsylvania, Oct. 17, on "Earthquakes and Volcanic Eruptions."

RICHARD O. DENT has been elected assistant treasurer of the Utah Copper Co. and the Chino Copper Co., with headquarters in New York.

HENRY B. FABER and R. NORRIS SHREVE have formed a partnership as chemical consultants, known as Faber & Shreve, with offices at 50 East 41st St., New York City.

G. W. FULLER of New York read a paper Oct. 16 at the Philadelphia Engineers' Club on the Pollution of Streams by Industrial Wastes.

JOHN HOWE HALL, recipient of the J. H. Whiting gold medal of the American Foundrymen's Association at its recent meeting, for outstanding achievements in metallurgy, has resided at High Bridge, N. J., since 1908, when the Taylor-Wharton Iron & Steel Co. established at this location, acting as metallurgist for the company. In 1911 he was placed in charge of heat-treating and steel-making at the plant. One of his metallurgical achievements has been the development of special manganese steels and the devising of a method of melting ferromanganese for use in the manufacture of manganese steel in the cupola, instead of by the crucible plan. He is also credited with the development of special heat-treating processes for melting manganese in electric furnaces.

Dr. CHARLES H. HERTY, president of the Synthetic Organic Chemical Manufacturers' Association, has sailed for Europe for a vacation of several weeks.

Dr. H. E. KIEFER, formerly manager of the Monroe Color & Chemical Co. of Quincy, Ill., and Mrs. Kiefer are spending the winter at Buena Vista, Miami, Fla., in the interest of the latter's health.

ROLAND M. KOHR, formerly with the National Refining Co. at Findlay, Ohio, is now metallurgist and special chemist for the Grasselli Chemical Co. of Clarksburg, W. Va.

NORMAN W. KRASE has resigned from the Fixed Nitrogen Research Laboratory to accept an instructorship at Yale University in the department of chemical engineering.

LEROY H. MINTON, general superintendent of the General Ceramics Co., Metuchen, N. J., and past president of the American Ceramic Society, has received the nomination for Republican committeeman in the third district, and will be on the ballot at the forthcoming general election.

W. L. LAWSON has been appointed general manager of the Holly Sugar Corporation, to succeed S. W. Sinsheimer, with headquarters at Colorado Springs, Colo.

H. C. PARMELEE, editor of *Chem. & Met.*, spoke over the radio from Station WJZ, New York, Oct. 10, on "The Work of the Chemical Engineer."

Dr. GEORGE OTIS SMITH, director of the U. S. Geological Survey, addressed the Boston Section of the American Institute of Mining and Metallurgical Engineers, Oct. 16, on "Lessons From the Coal Commission's Work."

CHARLES B. WARREN of Detroit, Mich., has been re-elected president of the Michigan Sugar Co., Saginaw, and will also act as general counsel for the company. WILLIAM H. WALLACE of Saginaw has been relected third vice-president and general manager.

E. W. WASHBURN addressed the Chemical Society of Washington at its 344th meeting on Oct. 11, on the subject of "Physical Chemistry and Ceramics."

Important Articles In Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

ECONOMY FORMULAS FOR LABOR-SAVING EQUIPMENT. Explaining the formulas developed by the Materials Handling Division, American Society of Mechanical Engineers, for measuring the comparative monetary value of various material handling installations. *Management & Administration*, October, 1923, pp. 443-444.

MANUFACTURE OF ENGLISH CHEMICAL PORCELAIN. G. N. White. The scientific basis of a work which resulted in successful commercial production of British laboratory porcelain, involving solution of complex ceramic problems. *Chemical Age*, London, Sept. 29, 1923, pp. 334-335.

PUMPING SYSTEM FOR A SULPHITE PULP MILL. H. E. Stafford. A short, illustrated discussion of operating details for a system that supplies water to the 50-ton Provincial Paper Mills, Ltd., Port Arthur, Ont. *Industrial Engineer*, October, 1923, pp. 489-90.

MODERN EQUIPMENT AIDS IN QUANTITY PRODUCTION OF CHINA CLAY. A short, illustrated description of the English china clay industry. *Ceramic Industry*, October, 1923, pp. 232-234.

ALTERATION OF RATE OF VULCANIZATION AND DETERIORATION OF RAW RUBBER DURING STORAGE. B. J. Eaton and R. O. Bishop. Detailed tabulation of results of investigations carried out on raw rubber stored in the tropics. *J. Soc. Chem. Ind.*, Sept. 28, 1923, pp. 389T-392T.

Obituary

HARRY E. HAMILTON, a chemical engineer employed at the St. Louis Coke & Chemical Co.'s plant at Granite City, Ill., died Oct. 10 from burns received the day before by falling into a vat of boiling water while taking the temperature of it. Mr. Hamilton's home was in Portland, Ore., but he had been employed at Granite City for 2 years.

MANTON B. METCALF, president of Metcalf Brothers & Co., woolen merchants of New York, and a director of the Textile Alliance Export Corporation, died recently at his suburban home on South Center St., Orange, N. J., of heart disease. Mr. Metcalf was born about 60 years ago at Providence, R. I., and was educated in this country and at college in England. A few months ago he presented to a hospital in Orange a fine laboratory equipped for the radium treatment of cancer patients; and on Oct. 10 he and his brother, Jesse H. Metcalf, completed and presented to Brown University, at Providence, R. I., a chemical laboratory building, at a cost of $500,000, known as the Metcalf Laboratory. He is survived by his wife and three sons, Jesse, Manton B., Jr., and Rowe Browning Metcalf.

News of the Industry

Summary of the Week

American Gas Association holds fifth annual convention in Atlantic City.

French Society holds annual meeting, with interesting program.

Users of industrial alcohol object to separate bureau for prohibition enforcement.

Pulp to be manufactured from straw in Canada.

Merger of French chemical and color interests under discussion.

Uncertainty about arsenic production restricts offerings for distant deliveries.

Regulations drawn up for enforcement of naval stores act.

Tariff Commission may hold preliminary hearings before investigating production costs.

Contract prices are announced for 1924 deliveries of bleaching powder and liquid chlorine.

Clayton act to be tested in F. T. C. action against Aluminum Co. of America.

All grades of denatured alcohol advanced 2c. per gal. as season of increasing demand approaches.

Regulations for the Enforcement of the Naval Stores Act

Bureau of Chemistry Formulates Rules for Establishing Standard Grades and Regulating Traffic in Rosin and Turpentine

AFTER numerous conferences with representatives of the branches into which the naval stores industry is divided, the Bureau of Chemistry has completed the regulations it proposes to use in connection with the enforcement of the act making compulsory the establishment of standard grades for naval stores.

Criticism Is Invited

The proposed regulations have been mimeographed and are being distributed among producers, dealers, factors and users of these products, in the hope that they will offer any criticisms or suggestions which may occur to them. If these suggestions are in sufficient volume to justify it, a public hearing will be conducted at which proposed changes can be discussed. The regulations have been drawn up under the personal direction of Dr. F. P. Veitch of the Bureau of Chemistry. He believes there will be no particular objection to them and that they can be promulgated promptly.

Scope of the Act

The provisions of the act apply to all sales of spirits of turpentine and rosin or anything offered as such in interstate or foreign commerce or in the District of Columbia, territories and possessions of the United States. The act forbids all sales of spirits of turpentine and rosin in interstate commerce under or by reference to United States standards which is other than what it is represented to be.

Regulations 5, 6 and 7 refer to establishing or modifying standards. They read as follows:

Establishing New or Modified Standards

Regulation 5—Whenever in the opinion of the Secretary a standard is necessary for naval stores for which no standard is provided, or whenever for reasons deemed by him sufficient the interests of the trade require a modification of an existing standard, opportunities to be heard will be given those favoring or opposing the proposed standard or proposed modification of a standard. Where the hearing is to be called for consideration of new standards, 3 months' notice in advance of the hearing will be given; where the hearing is to be called for consideration of the modification of an existing standard, 6 months' notice in advance of the hearing will be given. When a standard is established for naval stores for which no standard is provided, such standard shall become effective after 3 months from the date of the promulgation thereof; when an existing standard is modified, such modification shall become effective after 6 months from the date of the promulgation thereof.

Standards for Spirits of Turpentine

Regulation 6—Until other standards for spirits of turpentine are established by the Secretary the following standards are in effect:

1. Gum spirits of turpentine—that is, the spirits of turpentine made from gum (oleoresin) from a living tree.

2. Steam distilled wood turpentine—that is, wood turpentine distilled with steam from the oleoresin within or extracted from the wood.

3. Destructively distilled wood turpentine—that is, wood turpentine obtained in the destructive distillation of the wood.

Standards for Grading and Classification of Rosin

Regulation 7—Unless and until other standards for rosin are established by the Secretary, the standards for rosin are the rosin types prepared and recommended by the Secretary prior to March 3, 1923, and the various grades of such standards from highest to lowest, shall be designated, unless and until changed, by the following letters respectively: X, WW, WG, N, M, K, L, H, G, F, E, D and B, together with the designation "gum rosin" or "wood rosin" as the case may be.

Under regulation 15 costs of analysis, classification and grading are discussed. The person requesting the analysis shall pay a fee of $2 and in addition a fee of 4c. per package for marking.

For the classification and grading of each lot of rosin pursuant to these regulations the person requesting the classification or grading shall pay a fee of 10c. per package for classification, grading and marking the package. The minimum charge, however, is $1.

The fee for the analysis of a sample of rosin shall be fixed by the chief of bureau in each instance.

Regulation 16 gives directions for proper labeling. This regulation follows:

Labels

Regulation 16—(*a*) Naval stores under this act are not required to be marked, branded, or labeled except in accordance with the requirements of Regulation ——

(*b*) The word "turpentine" or the word "rosin" singly or with any other word or words, or any compound, derivative or imitation of either such word, or any misleading word, or any word, combination of words, letters or combination of letters, provided by the act and by these regulations, shall not be used in commerce, in selling, offering for sale, advertising or shipping anything that is not naval stores of the United States standards.

(*c*) Spirits of turpentine in commerce shall be designated or described as "gum spirits of turpentine," "steam distilled, wood turpentine" or "destructively distilled wood turpentine," as the case may be.

(*d*) If spirits of turpentine are described on the package, the terms "gum spirits of turpentine," "steam distilled wood turpentine" or "destructively distilled wood turpentine," as the case may be, must be used.

(*e*) Rosin in commerce shall be designated and described by the letter or letters signifying its standard, together with the classification "gum rosin" or "wood rosin," as the case may be.

(*f*) If rosin is described on the package, it must be described by the letter or letters signifying its standard, together with the classification "gum rosin" or "wood rosin," as the case may be.

Labeling U. S. Examined Turpentine and Rosin

Regulation 17—(*a*) Except as to tank cars, the inspector shall mark upon each package of a lot of turpentine examined by him at the request of an interested person, and found to be of United States standard, the fact that it has been U. S. examined, together with the classification, the grade, the number of the certificate and such further marks as the chief of bureau shall require. If, however, the article examined does not comply with any of the U. S. standards, the packages containing same shall not be marked by the inspector.

(*b*) The inspector shall mark upon each package of a lot of rosin examined by him, at the request of an interested person, the fact that it has been U. S. examined, together with the classification, the grade, the number of the certificate, and such further marks as the chief of bureau shall require. If the article in the package is not rosin, the package shall not be marked by the inspector.

Unusual Lectures to Be Given at M.I.T.

A series of twelve lectures by outstanding men in industry is planned during the coming winter to be given at M.I.T. J. E. Aldred, successful in many fields as a construction engineer, is co-operating with the faculty in arranging these lectures, of which the first, on Nov. 9, is to be by Gerald Swope, president of the General Electric Co.

Mr. Aldred believes that "it will be a contribution to the engineer's training if the proposed lectures give the student an opportunity of coming in contact with men who have made an outstanding success in their various lines of undertaking and who best illustrate the value of practical experience, coupled with technical knowledge. This contribution is put forward with the hope that it will assist the graduate student going out to take up his life's work by his having in mind at the outset of his career that the work he is to do must be a practical contribution to the problems of the day."

Tariff Commission Adopts New Policy in Conducting Hearings

Will Reveal Production Costs Prior to Public Hearing—May Hold Preliminary Hearing Before Investigating Costs—Chemicals on Schedule for November

THE Tariff Commission has set Jan. 15 as the date for the public hearing on the application of the United States Sugar Association for a reduction in the duty on sugar.

The commission, in this case, also has announced a new policy with respect to hearings under the flexible provisions of the tariff act in that on or about Dec. 1 it will make available to interested persons a summary of the information on costs of production of sugar gathered by its investigators in the United States and abroad, and also a statement of basic points and problems such as the rate of interest allowed by the commission, depreciation allowances, etc. Heretofore, no summary of information has been made available in any case until after the public hearing, and thus the summary was of value only in presenting final arguments.

It is understood that the commission has under consideration a suggestion that, in all cases docketed for investigation under the flexible tariff hereafter, a preliminary hearing be held previous to the field investigation, where basic problems may be discussed, and that a summary of information be presented interested parties prior to the final hearing, so that definite figures may be discussed at the hearing rather than abstract arguments.

Indications are that several reports in cases in which final arguments have been presented will be presented President Coolidge for his action within a month. The complete record of the investigation will be sent to the White House in each case, but for the convenience of the Executive a summary of the findings of fact will be prepared by the commission. The staff has been ordered to prepare summaries in all cases which have been completed. The commission will meet Oct. 22 to consider the summary in the case of casein and on Oct. 23 will consider the summary in the sodium nitrite case. The commission will present findings of fact only, without a recommendation as to the action of the Executive under these findings.

Several hearings are scheduled for next month which will be of interest to the chemical trade. On Nov. 5 oxalic acid will be the subject of a public hearing at which differences in cost of production will be gone into. Next on the list is diethyl barbituric acid and its derivatives. The hearing on the latter is set for Nov. 7. A hearing on barium dioxide will be conducted on Nov. 9 and on Nov. 12 and 14 there will be hearings respectively on logwood extract and potassium chlorate. All these hearings will be held at the office of the United States Tariff Commission and will begin at 10 o'clock in the morning.

Pig Iron to Be Produced From Copper Slags

H. S. Munroe, vice-president and general manager of the Granby Consolidated Mining, Smelting & Power Co., announced recently that his company has succeeded in producing pig iron in a small experimental reverberatory furnace from the Anyox copper blast-furnace and converter slags. Mr. Munroe emphasized the fact that as yet it was not known whether the thing could be done commercially; the main point at present is that the company has made and is making pig iron from the slag, and every effort will be made now to do it on a commercial scale. The slag averages 52 per cent in iron, the other ingredients being mainly silica, lime and alumina. The company is producing on an average 400 tons of slag per day. In the past this has been a waste product, and if it can be turned to useful account in the manufacture of pig iron, it will mean a great saving. There would be no cost of mining or transportation and it is probable that the molten slag could be transferred from the copper blast furnaces to the iron reverberatory furnaces, thus making a saving in fuel.

French Chemical and Color Interests Plan Merger

An accord appears about to be consummated between the Etablissements Kuhlmann and the Compagnie Nationale des Matières Colorantes, the former one of the largest operators in industrial chemicals in France and the latter virtually a consortium controlling the dye interests in France. Any precise information at this time would be premature, but it is understood that only the details of the fusion remain to be decided upon.

Conversations, as is the French expression, are going on toward this end which should result in a decision and the conclusion of an arrangement soon.

News in Brief

A Meeting of the Dyestuffs Division of the Synthetic Organic Chemical Manufacturers' Association of the United States was held in the clubroom at the Hotel du Pont, Wilmington, Del., Oct. 8, following a dinner at the hotel. Dr. R. N. Wallach of the Grasselli Chemical Co. presided as temporary chairman. An address was made by Francis P. Garvan.

A New Chemical and Physical Research Laboratory is planned by the National Tube Co. of Pittsburgh. It will be located on Forbes St., adjoining property held by the federal government, including the United States Bureau of Mines. A small tract of government property is needed to square the site for the proposed building, and application has been made at Washington for the transfer of the land. It is said that the Tube company is arranging an appropriation for the new structure and that plans will mature in about 90 days. N. F. Speller, chief metallurgical engineer for the company, is actively interested in the project.

Revised Figures of the Loss caused by the recent fire at the plant of the Mitchell-Rand Manufacturing Co., Jersey City, N. J., show an amount of from $10,000 to $12,000, as compared with a previous reported estimate of $200,000. The large volume of smoke due to burning rosin and chemical products created an opinion of heavy damage. Only a few minor buildings were marred by the fire, and operations are being continued at the plant. The damage will soon be replaced.

Arrangements for the Washington Meeting of American Chemical Society have been planned definitely for the week of April 21. The Council meeting will be on Monday of that week, a general meeting on Tuesday, and the following three mornings will be devoted to divisional meetings and the afternoons to sightseeing at the technical institutions in the city.

"Bridging the Gap Between Masses and Molecules," a talk by Dr. Jerome Alexander, National Research Council, Washington, D. C., was the feature of the Oct. 12 meeting of the California Section of the A.C.S. This meeting was held at the Engineers' Club, San Francisco. It was announced at this meeting that copy for the roster of the section is practically ready for the printer.

As the Result of a Conference between the minister of highways of the province of Saskatchewan and officials of the Federal Department of Interior, the briquetting plant at Bienfait, Sask., over which there has been so much discussion lately, is to be continued in operation for the next 3 months. As the result of recent investigations it is hoped to be able to develop during the 3 months' period a process of briquetting that will justify the large expenditure of approximately half a million dollars already made.

The Engineering Extension Service, Purdue University, Lafayette, Ind., is perfecting plans for short courses of instruction on "Steel and Its Treatment" in about twenty cities of the state during the coming school year. It is purposed to arrange the courses in a series of six class meetings, covering primarily the manufacture, hardening and tempering of steel.

The Resumption of Operations at mill of the Continental Sugar Co., at Findlay, Ohio, is planned and about 200 workers will be employed during the forthcoming season. W. E. Weller is superintendent.

"Sewage Purification; a Chemical Manufacturing Process," a talk by A. M. Buswell, Chief of the Illinois State Water Survey, was the main topic of the Oct. 19 meeting of the Chicago Section, A.C.S. Following this talk, four groups assembled for the discussion of special topics and laboratory methods.

A Crude Rubber Manufacturing Plant has been set up at Para, Brazil, for the production of crude rubber from the local raw product, according to a special report from A. O. Pierro, one of the members of the crude rubber expedition sent out by the Department of Commerce. The plant has a production of from seven to eight tons a day, and has been operating for eighteen months.

Operations Have Been Resumed at the local plant of the Sandusky Window Glass Co., Sandusky, Ohio, following an idle period of close to 6 months. Employment will be given to more than 100 men. Production will be maintained for some time to come.

The Pulp Mill formerly owned by the Nipigon Pulp & Fibre Co., situated at Nipigon, east of Port Arthur, will probably be purchased by the St. Lawrence Pulp & Paper Co. The mill was built at a cost of more than half a million dollars and had but a short career in pulp production, having commenced operations in May and closed in October of 1921, after which the property was taken over in liquidation.

The American Institute of Chemical Engineers is rapidly completing plans for its sixteenth annual meeting to be held in Washington, December 5 to 8. The detailed program has been approved and will appear in an early number of *Chem. & Met.*

Construction of a Cement Plant has been started by the Mainland Portland Cement Co. at Popcum, B. C., about 70 miles east of Vancouver, where a large deposit of marl has been purchased from Hart & Damask. It is stated that half a million dollars will be spent in the erection of the plant. The construction will be supervised by Mr. Budd, who has built several other cement plants in different parts of Canada.

Mathieson Announces Contract Prices on Chlorine and Bleach

The Mathieson Alkali Works issued an announcement in the early part of last week in which it named lower prices to contract holders on deliveries of bleaching powder over the last quarter of the year. It also named contract prices for 1924 on bleaching powder and liquid chlorine. The announcement follows:

The Mathieson Alkali Works (Inc.) announces that, on account of continued weaknesses in the market for bleaching powder, they have found it necessary to advise their contract customers that the price during the fourth quarter of this year will be $1.25 per 100 lb. for standard drums in carloads for shipments in October and $1.50 per 100 lb. for standard drums in carloads for shipments in November and December, both f.o.b. Niagara Falls, N. Y.

These prices will be made effective as of Oct. 1, and credits will be issued on shipments made between that time and this announcement.

The company also announces its prices for next year on both bleaching powder and liquid chlorine, stating that it will accept 12 months' contracts, effective Jan. 1, for liquid chlorine in carload lots in either ton containers or single unit tank cars at 3½c. per pound, f.o.b. Niagara Falls, N. Y., where the quantity is in excess of 50 tons per month; where the quantity is less than this, the price applying will be 3¾c. per pound, f.o.b. Niagara Falls, N. Y. Contracts for liquid chlorine in cylinders will be accepted at 5½c. per pound for carload quantities, and no less than 6c. per pound for less than carloads.

Contracts for bleaching powder in carload lots in standard drums will be accepted at $1.50 per 100 lb., f.o.b. Niagara Falls, N. Y.

Gas Manufacturers Co-operating With Welding Schools

The Gas Products Association, headquarters at 140 South Dearborn St., Chicago, recently appointed an educational committee to co-operate with trade and technical schools all over the country in supplying a practical and standard course in welding procedure. The users of oxy-acetylene welding equipment have never been thoroughly satisfied with the work done by welding school graduates, and at the same time the application for the welding processes has been extended to so many new fields that the demand for skilled operators is constantly increasing. It is thought that by making a thorough investigation of the needs of the industry and then making recommendations to welding school instructors, the instruction programs can be revised and standardized so as more fully to meet the requirements of the employers. The plan has been already submitted to some schools and has met with their enthusiastic response, so it is felt that the instructors are honestly desirous of giving fullest co-operation.

Washington News

Reduction in Asphalt Grades

In line with his campaign to eliminate waste in industry and in order to simplify paving practice and effect economies in road and street construction, Secretary Hoover of the Department of Commerce has effected an agreement among the highway engineers of thirty states, the American Society for Testing Materials, the Society for Municipal Improvements, the American Society of Civil Engineers, the United States Bureau of Public Roads, the Asphalt Association and five manufacturers not members of the latter, whereby the number of varieties of asphalt in use for paving purposes in this country are to be reduced, effective Jan. 1, 1928, from 88 to 9.

Transfer Stamp Required in Movement of Alcohol

The Treasury Department has issued the following ruling relative to the movement of alcohol: "On and after Oct. 1, 1923, an engraved industrial alcohol transfer stamp will be used in lieu of transfer certificate, form 1446, on packages and tank cars of alcohol transferred in bond from one industrial alcohol bonded warehouse to another; from an industrial alcohol bonded warehouse to a denaturing plant on other premises; from an industrial alcohol plant not having a bonded warehouse to a denaturing plant on other premises and from one denaturing plant to another. Each stamp has been provided with a stub or counterpart to be filled in with the same data as the stamp and they will be bound in books of 400 stamps each."

F.T.C. Seeks Modification of Order Against Aluminum Co.

The Federal Trade Commission has applied to the United States Circuit Court of Appeals for the Third Circuit, sitting at Philadelphia, for a modification of the order entered by that court sustaining an order from the commission directing the Aluminum Co. of America to divest itself of all stock ownership in the Aluminum Rolling Mill Company, of Cleveland, Ohio, so as to extend the order to prevent the Aluminum Co. of America from acquiring the physical assets of the Rolling Mill Co. Application for a preliminary injunction sought by the commission will be argued before the court at Philadelphia Oct. 23.

The application for modification of the order will test section 7 of the Clayton act in respect to acquisition of physical assets which tend to create a monopoly.

The Circuit Court of Appeals last November refused to modify its order upholding the Federal Trade Commission regarding stock ownership, which had been sought by the Aluminum company, in this sheet aluminum mill and refused a rehearing to the company, and the United States Supreme Court declined last spring to grant a writ of certiorari to the company, which would have brought the case before the high court for review.

On Aug. 13 last the Aluminum Co. of American sold to the Cleveland Metal Products Co. a two-thirds interest in the Rolling Mill company, par value $400,000, for $1,000. The rolling mill corporation was organized by the Metal Products Co. and the Aluminum company jointly, the former taking one-third of the capital stock of $600,000 and the latter two-thirds. The Aluminum company has notified the Federal Trade Commission of this sale, which was permissible to divest itself of the stock. The Aluminum company, however, alleges that the Rolling Mill company owes it $585,905 for pig and ingot aluminum supplied it, and threatens suit to collect. If judgment is rendered and a sale ordered, the Aluminum company, the commission avers, proposes to bid in the physical assets of the plant. The result would be evasion of the court order, the commission asserts, and would create a monopoly of sheet aluminum.

Investigation of Mineral Fillers

The investigation of the availability of certain minerals for use as fillers, together with a study of their physical and chemical characteristics and their adaptability to commercial uses, is being continued by the Department of the Interior, through the Bureau of Mines. The South has extensive deposits of clays, ochers, bauxite, talc, graphite, etc., and the purpose of this study is to determine their value for use as fillers in making linoleum, paper and other commercial products.

The laboratory study of the size and character of grains of non-metallic mineral fillers has been completed. The results show that these characteristics have an important bearing on the applicability of a mineral filler and the types of manufactured products in which it can be used.

Laboratory work on Georgia and Alabama white clays to determine their value for filler use has been completed. The samples investigated included 31 Georgia and 11 Alabama clays. Of the Georgia clays, 17 were selected for more extended semi-commercial tests, and 500-lb. samples were sent to the Ceramic Experiment Station of the Bureau of Mines at Columbus, Ohio, for washing, pulverizing and dispatching to the manufacturers who are cooperating in the factory tests. The laboratory tests have shown that a number of the Georgia clays tested are equal or superior in quality to the imported foreign clays now largely used in the paper trade. The bureau's tests also indicate the clays are of value in rubber filling, and rubber manufacturers are being furnished with samples of the Georgia clays, to test their value in rubber compounding.

Helium Appropriation to Be Considered Soon

Steps are being taken to insure the early consideration at the forthcoming session of Congress of the bill which proposes the appropriation of $5,000,000 for the production of helium. Preliminary hearings were conducted during the last session of Congress on this bill. This action was taken so as to make available the literature necessary to point out the scope of the plan. Further hearings will be held.

The bill authorizes the Secretary of the Interior to purchase gas containing helium and to acquire extraction rights in gases as well as to lease and purchase lands in helium-bearing gas fields. The measure further proposes that the Secretary of the Interior be authorized to undertake exploration work on such lands and to carry on experimental activities relative to the production and use of helium. The export of the gas could be undertaken only on permission of President.

The plant on a semi-commercial scale which just has been completed by the Bureau of Mines at Fort Worth is expected to demonstrate in the very near future whether or not the very promising results in the laboratory can be duplicated on a large scale. The study of the gas now has reached the point where very important economies can be effected in its manufacture, it is believed. The situation is entirely different from that at the time the earlier plants were constructed. At that time few data were available. These plants were started on good guesses and liquid air data in an effort to meet a war emergency. Now the research is well advanced and much more is known of the mechanical equipment necessary to secure the best results.

Federal Colors Lab Expands

On Monday, Oct. 8, the Federal Colors Laboratories began operations in its new plant at Cincinnati, Ohio. The construction of this plant is of the slow burning, heavy mill type. The grinding department is housed in a separate steel and glass building. In the designing of this plant particular attention has been paid to the obtaining of the maximum amount of natural light and ventilation.

The necessary control tests and also practical tests of products are made in a general plant and control laboratory, equipped with grinding machinery, printing and lithographing presses, etc. Another laboratory is fully equipped for all types of chemical research work.

These laboratories specialize in reds, especially the insoluble azo or pigment dyes and the lakes derived from them. Only a small selected line of green, blue, orange and yellow lakes for particular purposes is made.

Alcohol Trades Object to Separate Bureau for Prohibition Enforcement

Representatives of Scientific Societies and Industries Claim Such Procedure Would Seriously Handicap Scientific Research and Lawful Industry

THE proposal to create a separate bureau of government for the enforcement of prohibition, independent of departmental control and answerable only to the President, is condemned in a report submitted Oct. 20 to the Bureau of Internal Revenue by the Alcohol Trades Advisory Committee, composed of eleven representatives of scientific societies and industries in which alcohol is an indispensable chemical raw material. The committee claims that such a procedure would be contrary to long-established practice under our system of government and that it would seriously handicap scientific research and lawful industry. The committee showed that a similar scheme was incorporated in the Ernst-Wood bill, introduced in the last Congress, which was opposed by all scientific bodies and legitimate trades and failed even to be reported by the House Judiciary Committee after an open hearing. The committee adds: "The proponents of such a bureaucracy may be assured that it will be opposed with every ounce of energy that can be put forward by those engaged in lawful professions and businesses in which the chemical, alcohol, is required or used."

The committee points out that in the World War the production of non-beverage alcohol was rated as one of the nation's "key industries" and "is admittedly a basic chemical essential to our national defence, industrial and economical development, and to the advancement of civilization itself."

A comprehensive chart and other data are appended to the report, showing the innumerable scientific and industrial uses of alcohol. It asks from where is the essential future supply of alcohol for governmental, industrial, and scientific purposes to come. Under present conditions of prohibition law enforcement we have real cause to be concerned.

The committee characterizes the attacks upon the Secretary of the Treasury and the Commissioner of Internal Revenue as being unfair and unwarranted, both of those officials having but properly and justly exercised their statutory right of review. It states that the action of the government in placing in the hands of a Prohibition Commissioner without the essential technical and economic training the duty of carrying out the Congressional mandate to promote the use of alcohol in scientific research and development of lawful industries was illegal by implication, illogical by any method of sound reasoning, economically impracticable and should be forthwith corrected.

The committee recommends that the Commissioner of Internal Revenue designate a deputy commissioner or appoint an industrial alcohol commissioner to take over the administration of that phase of the law. In this way, it is claimed, efficient and scientific administration would be assured and at the same time the Prohibition Commissioner would be relieved from routine incidental to serving legitimate industry and could devote the necessary time to his logical police duties. The committee states: "We yield to no one in our adherence to the principle of law enforcement, but surely the national prohibition act can be so administered as not to interfere with the health, economic needs and the national defence of the country."

Trade Notes

The public hearing on the application for a change in tariff duty on brierwood pipes has been postponed from Oct. 17 to Oct. 31.

The Los Angeles Chemical Co. of Los Angeles, Calif., has succeeded the C. W. Hill Chemical Co. The change of name became effective on the first of the month; no change in the officers or principals of the company.

The naphthalene and coal-tar section of the plant of the Chatfield Manufacturing Co. at Cincinnati has been leased for a term of years to the White Tar Co. of New York.

Foreign agents of the Treasury Department have been instructed to investigate foreign market values of British, Norwegian, Swedish, Danish and German cement back to April 1, and to forward to the department any other information on the subject of dumping of this commodity.

August Merz of Heller & Merz has been elected chairman of the dyestuffs section of the Synthetic Chemical Manufacturers' Association. He succeeds the late Fred Signer.

The Bureau of Labor announces an upward trend to wholesale prices in September. The weighted index number of the bureau on chemicals and drugs was 128 for September and 127 for August.

Advices from Las Vegas, N. M., are to the effect that the West End borax mine, 45 miles northeast of that city, has been closed.

The Dominion Tar & Chemical Co. contemplates the erection in St. Boniface of a tar-distilling and chemical-manufacturing plant, at an estimated cost of $250,000.

Chemical Equipment Association Holds Annual Meeting

The Chemical Equipment Association's annual meeting was held at the Chemists' Club, New York, Sept. 20 at 2:30 p.m., President Schenck in the chair. The work of the association in the 10 months since it began active operations with a central executive office and a secretary was reviewed by President Schenck. Recommendations for the broadening of this work along lines of general service, advertising to equipment using fields and interchange of information among members were made.

Plans for Exposition

The association by unanimous vote of the members present instructed the new president to appoint a committee to formulate plans for an exposition of chemical equipment. This action followed a general discussion of the relation of expositions in general to the chemical industries in their present stage of development. It was very plainly the sense of the association that, valuable although the presentation to the general public or to selected sections of it the development of chemical manufactures may be, the interests of producers of equipment and supplies for the chemical industries and current conditions inherent in those industries point to the advisability of a selling exposition also.

New Officers Elected

Officers and directors for the ensuing year were elected as follows: President, T. C. Oliver, Chemical Construction Co.; vice-presidents, E. E. Finch, Karl Kiefer Machine Co.; J. George Lehman, Bethlehem Foundry & Machine Co.; Peirce D. Schenck, Duriron Co.; treasurer, P. S. Barnes, Pfaudler Co.; directors: Harlowe Hardinge, Hardinge Co.; P. B. Sadtler, Swenson Evaporator Co.; H. N. Spicer, Dorr Co.; R. Gordon Walker, Oliver Continuous Filter Co.; G. O. Carter, Union Carbide Co.

For the sixth place on the board of directors Robert McKay, International Nickel Co., and L. S. Thurston, General Electric Co., received an equal number of votes. One of these two will be elected to the board by the remainder of the directors.

Exposition Committee Appointed

President Oliver has announced the appointment of a committee to formulate plans for an exposition as follows: Edwin C. Alford, T. Shriver & Co., chairman; Peirce D. Schenck, Duriron Co.; E. E. Finch, Karl Kiefer Machine Co. The committee has been in session and has made considerable progress, it has been announced, in establishing general principles upon which definite plans will be based for presentation to the association.

The new board of directors of the association has been in session also and it is announced that every confidence exists that the activities of the association will both widen and become more intensive within the next year.

Gas Men Hold Record Convention

Exhibition, Technical Sessions and Social Events Contribute to Success

More than 2,000 members and guests of the American Gas Association participated in the meeting, exhibition and social events of the fifth annual convention of this organization at Atlantic City, Oct. 15 to 19. Made up of men from every branch of the industry, the association planned its program to serve every type of worker, meeting for general sessions each morning and for simultaneous sessions of the sections each afternoon. This year all of the six sections met—Accounting, Commercial, Industrial Gas, Manufacturers (equipment and appliance men), Publicity and Advertising, and Technical.

The Technical Section, which discussed the chemical and engineering problems of manufacture, distribution and utilization, offered much good material for the readers of *Chem. & Met.* This will be fully reviewed in the next issue, together with the outstanding items from the other special sessions.

John B. Klumpp, of the U. G. I. Company, Philadelphia, who has served as vice-president during the past year, was chosen as president of the association to succeed R. B. Brown of Milwaukee, the head of the organization during the past 12 months. C. O. G. Miller of San Francisco was named vice-president and H. M. Brundage was re-elected treasurer, the only other elected general officer of the society. Sectional vice-presidents, who are chairmen of the sections, were named as follows: Technical, L. J. Willien, C. H. Tenny & Co., Boston; Industrial Gas, H. H. Clark, Chicago; Manufacturers, G. W. Parker, Russell Engineering Co., St. Louis; Commercial, J. E. Davies, Chicago; Accounting, W. A. Sauer, Chicago, and Advertising, J. M. Bennett, Philadelphia.

Business Affairs Reported

The business affairs of the association were only briefly reviewed by Secretary-Manager O. H. Fogg and Treasurer Brundage. The continued growth in numbers of all classes of membership and increase in the annual budget were notable items. About $260,000 in receipts for the year exceeded expenditures and reinvestments; and the present condition of net assets is better by about $13,000, or more than 10 per cent increase above the last report. These and other facts show the strong financial standing of the body.

Amendments to the constitution approved during the year provide a new classification of individual members, with reduced dues to all; a new plan for natural-gas companies which become "company" members; and the authorization of the Industrial Gas Section, to deal with technical, commercial and sales problems in the large-scale use of gas by industries.

Plans for the 1924 convention could not be perfected, as expected facilities for exhibitions and meetings in one building probably will not be ready in Chicago in time for this meeting. The executive board is, therefore to fix the time and place later.

Exhibits Larger and Better

About 27,500 sq.ft. of exhibit space, better arranged than ever before, was well filled by 160 exhibitors. One section of the space was devoted to ranges, water heaters, room heaters and other domestic gas appliances; a second section included industrial equipment, plant machinery, distribution department supplies and related exhibits; while the third was well filled by companies showing accessories, meters, office and accounting facilities, publications, etc.

The booths afforded splendid social features for all in addition to business opportunities which seemed generally to reward amply most of the exhibitors. Other social features were afforded by an evening of entertainment and dancing, a rousing evening of fun on Steeplechase Pier, and a card party and tea for the ladies. The one serious subject for evening consideration was "public relations," discussed ably by four prominent state officials engaged in utility regulation work.

Large Increase in Production of Denatured Alcohol

Output Shows Remarkable Growth Since Pre-War Years—Numerous Formulas for Denaturing

ENORMOUS increase in the production of denatured alcohol, rising from 3,313,478.83 wine gallons during 1907-08, the first period for which figures are available following the enactment of the tax-free legislation of the previous year, to 33,299,166.37 in 1922, was reported by the American Chemical Society in making public the results of a survey conducted by James P. McGovern of Washington, D. C.

Of the 1922 yield, 17,089,263.54 gal. was specially denatured, and 16,209,902.83 was completely denatured. Striking increase in the number of formulas by which alcohol can be poisoned and rendered unfit for beverage purposes is shown.

Since tax-free denatured alcohol was first produced in the United States under the act of June 7, 1906, "for use in the arts and industries and for fuel, light, and power," 117 formulas, chiefly for specially denatured alcohol, have come into existence with the sanction of the Commissioner of Internal Revenue. More than half of the formulas have been devised since the World War, and most of these since prohibition.

"While," says the society's interpretation, "the total amounts for each of the fiscal years ended June 30, 1916, 1917, 1918 and 1919, respectively, exceed those for 1920, 1921 and 1922, the difference may be largely attributed to the tremendous withdrawals of specially denatured alcohol, Formula 2-B, for the manufacture of smokeless powder, trinitrotoluene and other war materials, and a comparison of the totals of the years shown (excluding the war years) will reveal with greater accuracy the normal but rapid growth of this husky industrial infant."

Industry, it is explained, is turning from potable tax-paid alcohol to specially denatured, tax-free alcohol. The result, it is said, is to enable the legitimate users of alcohol to obtain their requirements without carrying the burden of taxation. The chemists hold that alcohol is a raw material necessary to industry and should not be taxed any more than water.

Enactment of federal legislation supplemental to that of 1906 has caused the manufacture and use of tax-free denatured alcohol to become a vital factor in the commercial life of the nation as well as a "key" industry in war. Thousands of uses have been found for the formulas that have been devised, largely in cosmetics, perfumes and extracts. Formula No. 1, for specially denatured alcohol, alone has been put to 250 uses. Saying that the denatured alcohol industry has grown from humble beginnings to large proportions, the society's statement continues:

"The advent of prohibition presented an added, and perhaps more potent, reason why pure grain alcohol should be replaced as far as possible with tax-free denatured alcohol, and section 10, title 3, of the national prohibition act provided for denatured "by the admixture of such denaturing materials as shall render the alcohol or any compound in which it is authorized to be used unfit for use as an intoxicating beverage.

"To date, however, the government has not extended the use of tax-free denatured alcohol to the production of pharmaceuticals or other commodities, intended for 'internal' consumption, however unfit the final product may be for use as an intoxicating beverage. It is thought that this attitude with respect to 'internal' medicines, etc., is more a question of administrative policy than law, and that eventually the government will recede from its position in the interest of legitimate chemical development."

Following is a summary showing the annual use in gallons since tax-free denatured alcohol was authorized by Congress:

1907-08, 3,313,478.83; 1909, 4,555,937,29; 1910, 6,079,027.10; 1911, 6,881,129.86; 1912, 8,162,988.11; 1913, 9,830,658.54; 1914, 10,404,975.59; 1915, 13,986,468.77; 1916, 46,679,106.38; 1917, 55,679,597.63; 1918, 49,995,491.82; 1919, 38,282,182.11; 1920, 28,745,635.42; 1921, 22,193,839.15; 1922, 33,299,166.37.

French Society Holds Annual Meeting

Theory and Practice Divide Honors in Interesting Program and Discussion

Section Americaine de Société de Chimie Industrielle held an enthusiastic annual meeting at the Chemists' Club in New York on Oct. 12. The technical program consisted of a timely address on Salts in Solution, by Dr. Victor LaMer of Columbia University, and a paper by Prof. Ralph H. McKee on "The Proper Utilization of Sulphite Waste Liquors." The speakers were introduced by Dr. Ellwood Hendrick, retiring president of the American Section.

Dr. LaMer approached the subject of solutions from the standpoint of the change in the solubility of strong electrolytes following the addition of other strong electrolytes with and without a common ion. He showed in the case of dilute solutions where the complicating factors, such as the change in the hydration of the ions, compound formation and replacement of the solvent, can be ignored, and that the changes in solubility and corresponding variation in the activity of the ions could be most simply explained on the basis of the complete dissociation of a strong electrolysis.

From a consideration of the new experimental data carried out in conjunction with Professor Brönsted, Dr. LaMer showed that the anomalous changes in solubility in highly dilute solution were in strict quantitative agreement with the theory that they were due simply to the electrostatic forces that exist between charged ions. By also taking into account the influence of ionic size it is possible to extend their simple theoretical relationships into ranges of less high dilution.

Dr. Kendall's Views

Prof. James Kendall of Columbia, who was present, while attributing the highest praise to Dr. LaMer for his scholarship along these somewhat devious paths of knowledge and in full appreciation of his ingenuity in the development of his theory, admitted frankly that he hoped to find the answer to these perplexing problems along a somewhat different line of thought. Certain it is that the theory of Arrhenius does not meet the problems of the chemist. The simple dissociation theory fails in too many instances. Ghosh has given us a pretty guess, but it does not stand investigation. Dr. Kendall believed the only way to achieve wisdom in this matter is to pull together as well as we can in reaching, so to speak, the solution of solutions, in the hope that eventually a co-ordination of our thoughts and speculations may lead us to a vision of the truth. Our greatest need at present is to know more than we do of nature's great solvent, water.

Prof. Ralph W. McKee read a paper on "The Proper Utilization of Sulphite Waste Liquors." The time is probably not far distant when the owners of most sulphite pulp mills will find themselves in the same situation in which some find themselves already: that they must cease polluting streams with their waste liquors or shut down.

Professor McKee has worked out and put into practice a composite method of using all of the waste liquors. Without preliminary liming, the pulp is first fermented and the alcohol distilled off, after which the whole is evaporated to 50 per cent of waste content and then used as fuel. He computed that by an expenditure of about $440,000 on a 100-ton mill, every bit of the waste liquor would be consumed, and that the annual profit on such a layout would exceed $125,000.

Cement Production Booming

Unquestionably the cement industry has made a remarkable record this year in taking care of the demands placed upon it. Starting the year with nearly 2,000,000 bbl. less in stock than at the beginning of 1922, it has in 9 months shipped about 16,000,000 bbl. more than during the first 9 months of 1922, and yet stocks in manufacturers' hands are more than 750,000 bbl. greater than on Sept. 30 last year.

According to figures of the United States Geological Survey, production of portland cement in September eclipsed all previous records for any single month. For the first time the 13,000,000 mark was reached, the exact quantity produced being 13,109,000 bbl. Production for the 9 months ended Sept. 30 was slightly over 101,000,000 bbl., or more than was produced in any full year prior to 1922. Last year's 9 months' record output was exceeded by about 24 per cent.

Shipments from the mills during September, although less than in August, were greatly in excess of any corresponding month in past years.

To Manufacture Pulp From Straw in Canada

Plans to give western Canada an entirely new industry that may ultimately add many millions a year to the income of the citizens of the prairies have proceeded to such a stage that it can be now definitely stated that before next year's crop is harvested a mill to manufacture pulp from straw will be in full operation in the west, says the Montreal *Financial Post*. Only unforeseen difficulties will stand in the way of development.

The preliminary investigations of Sir Frederick Becker, who has been looking into the possibilities of establishing the industry in the west, proved fully satisfying, and now M. Dolfus, managing director of Devains Process, Ltd., of England and France, is in Canada arranging for the construction of a mill. This mill will have an initial daily capacity of 50 tons of pulp, which will require 150 tons of straw. It will cost between $1,000,000 and $1,250,000 to put up the first unit of the mill. This includes machinery and plant only.

Financial

The Barnet Leather Co., Inc., reports net earnings of $72,488 for the 9-month period ended Sept. 30.

For the fiscal year ended Aug. 31 the American Window Glass Co. showed a surplus of $2,757,556, as compared with $1,046,528 in the previous year.

The Lancaster Mills has declared regular quarterly dividends of 1¾ per cent on preferred and 2½ per cent on the common stock.

The Beech-Nut Packing Co.'s sales for the first 9 months of the year, as compared with the first 9 months of 1922, show an increase of 21.3 per cent. Net earnings for the 9 months were $1,907,843. This compares with $1,692,803 for the 9 months ended Sept. 30, 1922.

The stockholders of the Naumkeag Steam Cotton Co. have approved the recommendation of the directors to declare a stock dividend of 100 per cent, thus increasing the capital to $6,000,000.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	62½	61
Allied Chem. & Dye	62½	62
Allied Chem. & Dye pfd	106	106
Am. Ag. Chem	12½	12¾
Am. Ag. Chem. pfd	30½	32
American Cotton Oil	6	5¾
American Cotton Oil pfd	19½	18
American Cyanamid	75	*74
Am. Drug Synd	5¾	6
Am. Linseed Co	17½	16½
Am. Linseed pfd	36	34½
Am. Smelting & Refining Co	58	56
Am. Smelting & Refining pfd	97	97
Archer-Daniels Mid. Co., w.i.	26½	26½
Archer-Daniels Mid. Co. pfd.	89	91
Atlas Powder	52½	53
Casein Co. of Am.	*63	*63
Certain-Teed Products	*30	*30
Commercial Solvents "A"	30	32
Corn Products	119	123
Corn Products pfd	123½	117
Davison Chem.	45½	45¾
Dow Chem. Co.	*47	*47
Du Pont de Nemours	124¾	126½
Du Pont de Nemours db	86	85
Freeport-Texas Sulphur	12½	11½
Glidden Co.	*7¼	7
Grasselli Chem.	*132	*132
Grasselli Chem. pfd	*105	*105
Hercules Powder	107	108
Hercules Powder pfd	105	104
Heyden Chem.	1½	1½
Int'l Ag. Chem. Co.	1½	*1½
Int'l Ag. Chem. pfd	*7½	*6
Int'l Nickel	11½	11½
Int'l Nickel pfd	77	*78
Int'l Salt	*89½	78½
Mathieson Alkali	37½	34½
Merck & Co.	*79	*68
National Lead	117½	117
National Lead pfd	112½	113½
New Jersey Zinc	147	146
Parke, Davis & Co.	79	*79
Pennsylvania Salt	89½	89
Procter & Gamble	*132	*132
Sherwin-Williams	30½	31½
Sherwin-Williams pfd.	*100	*100
Tenn. Copper & Chem.	9	8¾
Texas Gulf Sulphur	57¾	56¾
Union Carbide	53	52½
United Drug	75	*74½
United Dyewood	42½	*42½
U. S. Industrial Alcohol	50½	49½
U. S. Industrial Alcohol pfd.	*100	*98½
Va.-Car. Chem. Co.	9½	8½
Va.-Car. Chem. pfd.	26½	*25

*Nominal. Other quotations based on last sale.

Market Conditions

Keen Competition Prevails Among Sellers of Chemicals

Many Commodities Easy in Price Due to Selling Pressure—Buying Reported Along Normal Lines

MANY traders reported an improvement in the market during the past week. Large consuming trades are not yet active and absorption of raw materials reflects this condition but it is stated that present trading in chemicals, judged by normal standards, is along seasonal lines, though admittedly below the levels established in the early part of the year.

Sellers, in many cases, are competing keenly for business and prices have reflected this condition to a more or less extent. Some of the basic chemicals are in a steady position both as regards movement into consumption and as regards price. Other chemicals have been bought sparingly and holders have pushed sales for spot and for forward positions. This has led to relatively low prices for contracts of certain chemicals.

Developments during the week in the market for bleaching powder have emphasized the weakness of this material. For the first half of the year bleach was on a steady price basis. In the early summer price-cutting by second hands became common but this was regarded as more or less a seasonal occurrence and was regarded as the usual procedure to dispose of stocks in the hot weather period. However, as soon as first hands entered into this competition a price war was inaugurated which subjected the market to the strongest kind of pressure with a disregard for values. Overproduction with consequent heavy surplus stocks was a factor in this price war but the feeling of rivalry has continued even after the surplus stocks have been reduced to a point where they are not oppressive. This is demonstrated by the establishment last week of contract prices for 1924 at levels below the cost of production.

The weighted index number for the week registered a fractional gain due to stronger markets for cottonseed oil and other associated products. If anything the price trend in the strictly chemical items was downward but such declines were more than offset by the rise in oil, etc. The index number is still considerably above that for the corresponding period last year.

The foreign situation is drifting along without any definite indication of what may be expected from German sources of supply. It is noted that arrivals of chemicals from abroad were fairly heavy last week and they included a varied assortment. Among the arrivals was arsenic from Japan but offerings for shipment are limited and the price is high. This is also true of arsenic from other foreign countries and considerable uncertainty surrounds this market. This is heightened by the fact that domestic producers have restricted offerings and according to some views home production may be curtailed.

Contract Prices Named for Bleaching Powder and Liquid Chlorine—Arsenic More Active and Firmer—Denatured Alcohol Up 2c. per gal.—Bichromate of Soda Easy—Prussiates Lower — Formaldehyde Weak — Imported Copper Sulphate Lower on Shipments

Acids

Acetic Acid—More encouraging reports are heard regarding the movement of this acid with all grades sharing in the improved call for supplies. This applies almost entirely to the domestic trade as export buying has not been prominent. Stocks of acid are still large enough to hold prices in an easy position. Quotations, however, are unchanged at $3.38@$3.63 per 100 lb. for 28 per cent; $6.78@$7.13 per 100 lb. for 56 per cent; $9.58@$9.83 per 100 lb. for 80 per cent; $12@12.78 per 100 lb. for glacial. The quotation on glacial varies more according to seller than is the case with the lower grades.

Boric Acid—There has been some reduction in unsold stocks but production is along generous lines and producers are competing keenly enough to hold prices at the low level reached a short time ago. Current quotations are 9½@10c. per lb. in bags; 10@10½c. per lb. in bbl.; and 10½@11c. per lb. in kegs.

Butyric Acid—An easy tone has prevailed in this market for some time and buyers have been able to negotiate prices on private terms. This condition still exists and buyers are not taking on large stocks owing to the lack of confidence in values. Sellers quote the absolute at 85@88c. per lb.; 60 per cent is held at 65@68c. per lb.; and 90 per cent at 80@85c. per lb.

Citric Acid—While most sellers are holding prices at 49@50c. per lb. both for foreign and domestic grades, the tone is easier. Buying has fallen off materially and stocks of imported held on spot are subject to bids with the result of an irregular price and the possibility of shading the quotation by a full cent per lb.

Hydrofluoric Acid—Trading is described as spotted with moderate improvement in the movement of all selections. There is no outstanding feature to the market as routine conditions predominate. Prices are fairly steady with quotations at 6@6½c. per lb. for 30 per cent; 10@10½c. per lb. for 48 per cent; 11@11½c. per lb. for 52 per cent; and 13@13½c. per lb. for 60 per cent.

Muriatic Acid—Most sellers report a better buying movement and a freer ordering out of stocks against old orders. Producers nearer the more active consuming centers are getting the benefit of the increased consumption as freight rates play an important part in making sales. The tone to prices is still easy as most first hands are well supplied and are eager to reduce holdings. Prices are quoted at 90c.@$1 per 100 lb. for 18 deg.; $1@$1.10 per cwt. for 20 deg.; and $1.75@$1.85 per cwt. for 22 deg.

Tartaric Acid—Weakness in price is still the feature of the market. Domestic acid is quoted at 34½c. per lb. but is not strong at that level due to the lack of interest on the part of buyers and the weakness in the imported material. The latter varies somewhat according to seller but 30½@31c. per lb. is given as the current market price.

Potashes

Bichromate of Potash—While some consumers are reported to be extending operations, others are restricting buying and the market for bichromate is still quiet. Prices are holding at 9½c. per lb. and upward depending on seller and quantity. Some export demand is reported but no important business has developed for outward shipment.

Caustic Potash—Imported caustic is meeting with a moderate call from consumers and spot offerings are unchanged in price at 7c. per lb. Shipments are quoted at the same figure as spot goods. Domestic caustic is steady at 7c. per lb. at works for carload lots, with smaller amounts ranging upward accordingly.

Chlorate of Potash—There is nothing

new in the situation as far as domestic chlorate is concerned. Production is continuing along restricted lines with a quiet call from consumers. Imported chlorate has met with a fair call but many consumers are covered ahead and this takes away from interest in spot goods. Prices for imported are described as easy at 7½c. per lb. with domestic holding at 8½c. per lb. and upward on a quantity basis, at works.

Permanganate of Potash—Imported permanganate has maintained a steady position in the spot market with supplies in firm hands. The quotation is 18c. per lb. and upward according to seller and quantity. The shipment market is quoted at 17½@17½c. per lb. with buyers not showing much interest. No change has been reported in the position of domestic producers and 17@17½c. per lb. at works is still quoted.

Prussiate of Potash—The downward tendency of prices is still in evidence and current quotations are the lowest yet heard for yellow prussiate. Spot material was offered at 28c. per lb. and shipments were available at 27½c. per lb. Demand is very quiet and this is largely responsible for the depression in prices.

Sodas

Soda Ash—There is a steady movement of ash from producing plants and the market is said to be in a healthy condition. Prices have not been subject to price cutting such as has been common in many materials and production appears to have been held in close conformity with consumption so there are no heavy unsold stocks. It has been generally conceded that prices were low and with full confidence in values buyers have operated freely. While improvement is reported in the jobbing trade, the bulk of the movement is in large lots against contracts. Light ash is quoted at 1.33c. per lb. in bulk at works and 1.45c. per lb. in bags. Dense ash is offered at 1.42c. per lb., bulk at works and 1.51c. per lb. in bags.

Bichromate of Soda—Actual trading is quiet although considerable forward business is reported to have been placed in recent weeks. Consumers are following quotations closely and the easier position of prices since the first of the month has served to destroy confidence in values. Judged on a basis of producing costs, it is held that the market should be free from any declines in price but the attitude of producers has led to the belief that they were eager to book orders irrespective of price. Quoted prices for round lots on contract have ranged from 7½c. per lb. to 7⅝c. per lb. according to seller but consumers have been offered under the inside figure and it is evident that prices are subject to negotiation.

Caustic Soda—Buying for export is reported for both standard and outside brands. The latter is reported to have sold at $3 per 100 lb. and $3.10@$3.15 per 100 lb. is quoted for standard makes. Expansion is reported in the home trade and inquiry has extended to large lots for future delivery as well as to moderate sized amounts for prompt shipment. Considerable business is said to have been placed for delivery well into next year on a basis of $3.16 per 100 lb. in carlots, at works.

Nitrate of Soda—Although importers are credited with having bought freely at producing points in recent weeks, there has not been much activity among domestic consumers and current business is not important. The price for spot nitrate is steady at $2.45 per 100 lb. and shipment prices range up to $2.60 per 100 lb. according to time of shipment. A report from primary centers states that total sales by the Chilean Nitrate Producers' Association for shipment after July 1, 1923, now amounts to 1,280,000 English tons, unshipped sales at June 30, 1923, to 140,000 tons, and estimate sales by the American companies and others outside the association to 90,000 tons. European deliveries for July-September amount to 132,500 tons, against 97,000 tons last year, the United States deliveries to 124,000 tons, against 69,000 tons, and other countries to 49,000 tons, against 30,000 tons, or a total of 305,500 tons, against 196,000 tons last year.

Prussiate of Soda—The asking price of first hands is 14c. per lb. for domestic prussiate but it is possible this price could be shaded as offerings of imported material are on the market at 13½c. per lb. spot. Imported for shipment from abroad is easy and 13½c. per lb. is given as representing the market price. Demand is very moderate and values are not expected to stiffen unless buying sets in more actively.

Miscellaneous Materials

Alum — Demand from some of the large consuming trades is not coming up to expectations but this is regarded as a temporary condition. Buying has gained in volume in recent weeks and inquiry has extended to the different grades. Inquiry also has been reported for distant as well as prompt positions. Ammonia alum, lump, is quoted at 3½c. per lb.; ground at 3.60c. per lb.; and powdered at 3.85c. per lb. Potash alum, lump, is held at 3c. per lb. and upward according to make and quantity, ground is offered at 4½@5c. per lb., and powdered at 4¾@5c. per lb. Soda alum is quoted at 3½@4c. per lb.

Arsenic—A much greater interest was shown in white arsenic in the past week. Buying orders came from consumers and also from others who may be influenced by the speculative possibilities of the market. Spot material was hard to locate in large lots and asking prices were very strong with sales reported at 13c. per lb. Many importers who ordinarily are factors are not quoting on shipments. Canadian arsenic is not offered and is nominal. On Japanese 13c. per lb. was asked with offerings restricted. Some reports stated that Japanese was held at 13c. per lb. for shipment through next March. Domestic makers are reserved and production undoubtedly is being curtailed due to conditions outside the arsenic market.

Bleaching Powder — An irregular market still continues for this chemical. Prices are not so low as were prevalent last month but sales of spot goods and also contracts covering forward positions are reported at different prices. The feature of the week was the announcement of contract prices for 1924, by one of the largest producers. The contract price is placed at $1.50 per 100 lb. for standard drums, in carlots, f.o.b. works. This price is said to be below actual producing costs and was established as the result of competition among sellers. The quotation for deliveries over the last quarter of this year also was revised downwards. About the first of the month one producer announced that contract holders would receieve last quarter deliveries at $1.65 per 100 lb., f.o.b. works. This producer reduced the price last week to $1.25 per 100 lb. for October delivery and $1.50 per 100 lb. for Nov. and Dec. deliveries. The revised schedule is retroactive to Oct. 1 and credit of the difference between $1.65 per 100 lb. and $1.25 per 100 lb. will be given on all Oct. deliveries made prior to last week's reduction in price. The fact that Oct. delivery is quoted under Nov. and Dec. is accounted for by the fact that spot and prompt shipments have been weaker than the more distant positions.

Copper Sulphate — Imported grades are easier for shipment with offerings at 4.40c. per lb. Imported on spot is quoted at 4¾c. per lb. but is in an easy position with demand quiet. Domestic sulphate is moving in a moderate way with prices holding at 4.90@5c. per lb.

Formaldehyde—Under a limited outlet the market remains in an easy position. First hands are offering prompt shipment at 12c. per lb. and it is possible to pick up odd lots at 11¾c. per lb.

Liquid Chlorine—Contract prices for liquid chlorine to apply over all of 1924 were announced last week by one producer and while other producers have not yet issued their price schedules, the openly quoted list is expected to prevail generally. The new contract price quotes carload lots in either ton containers or single unit tank cars at 3½c. per lb., f.o.b. works, in quantities in excess of 50 tons per month. For quantities less than 50 tons per month the price is 3¾c. per lb. and for less than carload lots in cylinders the contract price is 6c. per lb. All above quotations are at works.

"Chem. & Met." Weighted Index of Chemical Prices

Base = for 1913-14

This week	165.99
Last week	165.17
Oct., 1922	152.00
Oct., 1921	151.00
Oct., 1920	263.00
Oct., 1919	233.00
Oct., 1918	280.00

Crude cottonseed oil advanced and this is reflected in the week's index number which moved upwards to the extent of 82 points.

Coal-Tar Products

Benzene Lower on Increased Competition—Phenol Offered Freely —Salicylates Steady—Xylene Easy

COMPETITION for business brought out further unsettlement in prices for benzene. Continued weakness in gasoline was a factor in the lower grades. Intermediate makers have experienced little difficulty in obtaining supplies of the refined product at concessions. One of the leading producers admitted that business in 90 per cent benzene at 21c. per gal., tanks, has been possible ever since the first of the month. At the close it was possible to secure supplies at this figure in more than one direction. The price of 26c. per lb. on U.S.P. phenol, in drums, immediate shipment, was generally accepted as the trading basis. Offerings of phenol were liberal enough to create a rather unsettled feeling and on contract favored buyers could have obtained quantity lots at moderate concessions. There were sellers of flake naphthalene for immediate as well as forward delivery at 6c. per lb., carlots.

Solvent naphtha was nominally unchanged, but inquiry has fallen off somewhat of late and prices are no longer firm. Xylene, crude, was reduced by makers. As the period for increased consumption of salicylates is near at hand, producers are inclined to talk the market up. It is pointed out that recent reductions in phenol have been inconsequential. A shipment of creosote, in bulk, arrived at New York from abroad during the week.

The output of byproduct coke in the United States in September, according to the Geological Survey, was smaller than in August, reflecting a decline in production of pig iron and steel. The total production for the month was 3,112,000 net tons, comparing with 3,239,000 net tons in August and 3,267,000 net tons in July. The coke produced was 85.8 per cent of the present capacity of all the plants in the United States.

Aniline Oil and Salt—First hands reported the market as steady at 16c. on the oil and 23c. on the salt, immediate shipment from works. On scattered lots, through second hands it was possible to shade the market. Demand was routine only.

Benzene—It develops that producers offered 90 per cent benzene to the trade on the basis of 21c. per gal., in tanks, f.o.b. works, ever since Oct. 1. The pure has been reduced to 23c. per gal., tanks, f.o.b. works. In view of the continued weakness in gasoline, the prices now being realized on the motor grades are comparatively low. Producers, in order to offset the drop in prices for motor fuel, have made every effort to support the market for refined benzene, but competition has finally eased prices to such an extent that an open cut could no longer be avoided.

Beta-Naphthol—Prices were barely steady, ranging from 20@22c. per lb. on the technical variety.

Creosote—Foreign markets were unchanged, according to advices received here during the week. A cargo of slightly more than 4,000 tons of creosote arrived from the Continent.

Cresylic Acid—On the 97 per cent material traders were asking from 75@80c. per gal., with 95 per cent material available at 70@75c. per gal., as to quantity and seller.

H Acid—Producers reported steady demand for small lots. Contract business showed no improvement. Prices held at 75@80c. per lb., as to quantity and make.

Naphthalene—Interest centered in the market for flake. Producers report that competition for contract business has been exceptionally keen and prices presented a rather unsettled appearance. Open quotations on flake range from 6@6¼c. per lb., carload basis. Ball held at 7c. asked. Chips settled nominally at 5¼@5½c. per lb., carload lots, immediate shipment from works. Crude of good quality was unchanged at 2½c. per lb., c.i.f. N. Y.

Ortho-Toluidine—First hands continue to quote 18c. per lb., but admit that the undertone has eased and that business could have been placed in some directions at concessions.

Phenol—Leading sellers all met the recent reduction in price to the 26c. per lb. basis on U.S.P. phenol. Offerings were fairly liberal and the market was barely steady. Buyers took hold sparingly, believing that prices will go even lower before long. Producers, on the other hand, say that prices are approaching cost and that a drastic cut from the prevailing trading level is hardly possible. On forward business it was possible to shade 25c. per lb., in drums, carload basis.

Pyridine—The spot situation was unchanged, offerings being scanty and prices entirely nominal. On futures, for shipment from abroad, it was possible to shade $4 per gal., but prospective buyers were interested chiefly in nearby stuff.

Salicylates—A better feeling prevailed in the market for salicylates and with demand on the increase some traders look for improvement in prices. Quotably the market was unchanged.

Solvent Naphtha—Supplies were a little larger and first hands were in a position to offer water white, in drums, at 32c. per gal., and in tank cars, at 27c. per gal., f.o.b. works.

Xylene—Commercial quality xylene was offered by leading producers at 29c. per gal., in tanks, f.o.b. point of shipment. The market was easier. On the pure, in drums, prices range from 50@55c. per gal., as to quantity and seller.

French Ocher Output Below Pre-War Levels

The industry of extracting and preparing ocher is developed to a larger extent in France than in any other European country. The production is centered in two departments—Yonne and Vaucluse—the latter being in the Marseille consular district. While the production of Vaucluse is considerably smaller in quantity than that of Yonne, it is of superior quality both in color and texture, and the output has a higher total money value.

The title to ocher beds rests entirely in the landowner, who is generally a small farmer. No mining concession is needed for extraction, which is, in general, a seasonal occupation of the peasants. No special taxes or exemptions are applied to the industry.

An estimate from a reliable source places the ocher production of the Apt (Vaucluse) region at 20,000 metric tons for 1922, as compared with approximately 60,000 tons for the last year before the war. The latest official figures (1920) showed about 11,000 tons produced.

The crude product is generally treated near the pit and on the same property. Little power is consumed, and there are no byproducts. None of the product is consumed at the pits nor in the centers of production.

Ocher in barrels is bought and sold by a number of companies, some of which also exploit their own properties. Prices, in barrels, at the Apt railway station vary from 30 to 40 francs per 100 kilos for all ordinary grades, depending on the quality and on the reputation of the seller. There is no further preparation in France after the pulverized ocher is placed in barrels, marked and tested.

The product of Vaucluse find a ready market in the United States and in Great Britain, the former taking about 50 per cent and the latter about 35 per cent of the total production. Exportation is through Marseille. The product of the Department of Yonne goes largely to northern French ports.

It is said that by careful grading in foreign countries a mixture is made of ocher from the two French fields which gives excellent results. No such mixtures, however, are produced in France.

Alcohol

Denatured alcohol was advanced 2c. per gal, early in the week. The uplift was expected in trading circles, as the season for increased consumption is near at hand. The 188 proof completely denatured closed at 43c. per gal., in drums, carload lots. On the special 190 proof first hands quote 42c. per gal., in drums, carload lots. No change occurred in the market for ethyl spirits, the U.S.P. grade holding at $4.75@$4.80 per gal., cooperage basis. Methanol was in fair demand, but with offerings liberal prices were barely steady. The 95 per cent material settled at 98c. per gal., and the 97 per cent at $1 per gal., in bbl., carload lots.

Vegetable Oils and Fats

Crude Cottonseed Higher; Statistics Not Favorable—Argentine Flaxseed Crop May Set New Record

DISTRIBUTION of refined cottonseed oil during the month of September did not come up to expectations. The feature in the linseed oil situation was the bearish report on acreage sown to flaxseed in the Argentine. Demand for coconut china wood, palm and soya bean oils was inactive. Corn oil was irregular in the Middle West. Tallow was quotably unchanged. Fish oils ruled steady.

Cottonseed Oil—Tenders for October refined oil came out in a rather limited way, which served to take some of the edge off the market. Early in the week October oil sold on the Produce Exchange at 12.15c. per lb., but subsequent business went through under 12c. A rather bearish report on consumption of oil during September failed to shake out the longs, who still believe that more than 10,000 bbl. will have to be delivered before the expiration of the October option. Refiners operated on both sides of the market and sentiment towards the close was decidedly mixed. Most traders held to the opinion that prices should ease off as soon as October is out of the way. Seed arriving at the mills has been showing up poor in quality and refiners report refining losses of close to 9 per cent. Compound business continues fairly active and producers again entered the market for nearby crude, cleaning up offerings at 8¾@9c. per lb., f.o.b. mills, tank car basis. This buying steadied the market and at one time holders refused to shade 9¼c., southeast of Texas. Later crude offerings increased and sales on Thursday were reported at 9¼c., immediate shipment from the Southeast. Lard compound closed at 13½@13⅝c. per lb., carlots, as to seller.

Linseed Oil—After a firm opening prices for oil eased off on bearish developments in the Argentine. The first official estimate on flaxseed places the area at 5,253,000 acres, which compares with 4,048,000 acres last season. On a yield of slightly more than 14½ bu. per acre the crop is estimated at 77,000,000 bu., comparing with 52,960,000 bu., the revised estimate on the 1922-23 production. Crushers believe that the Argentine will, in all probability, come along with a record crop, and even should the preliminary figures prove too high enough seed may be raised to create a very bearish situation. News on the condition of the crop has been favorable and January forward shipment seed has already sold down to $1.73 per bu., Buenos Aires. November shipment old crop seed closed nominally around $1.98 per bu. As soon the crop report became public property the seed markets weakened, Duluth selling off more than 10c. per bu. from the recent high. Demand for oil was moderate. Prompt shipment oil sold at 93c. per gal., carload lots, in cooperage, although crushers said that they did not care to do less than 95c. on spot. November shipment oil settled at 90@91c., with December forward at 88@89c., cooperage basis.

China Wood Oil—The market was quiet and prices irregular. Spot oil sold in a small way at 21@21½c. per lb. On the Pacific coast futures settled at 20c. per lb., tank cars.

Coconut Oil—Several cars sold at 8½c. per lb., November shipment from the coast. In New York the market held at 8⅝@8¾c. per lb., sellers' tanks, nearby positions. Demand, taken as a whole, was quiet.

Corn Oil—There were offerings of crude oil at 8¾c. per lb., tank cars, f.o.b. point of production.

Palm Oils—Tin plate makers took on some Lagos oil at 7¾c. per lb. Soap makers could not be interested. Niger for shipment closed at 7.20c., with softs at 7.50c., and Lagos at 7¾c., c.i.f. N. Y.

Palm Kernel Oil—There were offerings at 8¼c. per lb., in bbl., New York, immediate shipment.

Soya Bean Oil—A parcel of resale crude oil sold at less than 9c. per lb., sellers' tanks, duty paid, prompt shipment from New York.

Fish Oils—English cod oil sold at 59c. per gal., c.i.f. New York. Newfoundland cod oil held at 66@68c. per gal., spot. Crude menhaden oil sold at 47½c. per gal., tank cars, f.o.b. Baltimore. Fishing returns on menhaden were poor.

Tallow, Etc.—Early in the week outside goods equal to extra tallow in quality sold at 7¼c. Later demand fell way and the nominal price at the close was 7⅜c. on extra. Yellow grease held at 6⅝c. Oleo stearine closed easy at 12¼@12½c. per lb.

Miscellaneous Materials

Antimony—Immediate shipment from New York, Chinese brands, was offered at 7.60c. per lb. Cookson's "C" grade, 10¼@10½c. per lb.

Casein—Imported material was offered a little more freely, but the shipment market held at 14½@15c. per lb., c.i.f. New York. Domestic material for immediate delivery closed at 15½@17c. per lb., as to grade.

Glycerine—There was some irregularity in prices named for chemically pure glycerine for shipment, competition being keen where contract business was under consideration. Generally, the market stood at 17c. per lb., in drums, but actual transactions did go through at close to 16½c. Dynamite glycerine sold recently at 16½c. per lb., carload basis. Crude was barely steady, saponification, basis 88 per cent, closing at 12¼@12½c. per lb., loose, f.o.b. point of production. Soap-lye crude, basis 80 per cent, held at 10¾@11c. per lb., loose, f.o.b. point of production.

Naval Stores—Demand for spirits of turpentine was slow and easier prices prevailed, the market settling at $1.01 per gal., immediate shipment, New York. Export call was particularly quiet, which unsettled prices in the South. On rosins closing prices were from 5@10c. per bbl. lower. Common grades went off to $5.80 per bbl.

Shellac—Cables from Calcutta were easier, and, with spot stocks augmented by recent importations, offerings increased. Final prices were 1@2c. lower, T.N. being available at 62c. spot and 61c. nearby delivery. Bleached, bone-dry, was available at 73@74c. per lb.

White Lead — The official contract price for pig lead was unchanged at 6.85c. per lb., with demand good. The steady market for the metal was reflected in the trade for lead products and corroders maintained prices for the different pigments on the schedule announced some time ago. Standard dry white lead held at 9¾c. per lb., in casks, carload lots, all positions, buyers being protected by the guarantee against decline clause contained in the regular contract. Sublimed white lead held at 8¾c. per lb.

Zinc Oxide—Producers look for no great activity until improvement of a substantial kind is reported by the rubber industry. The paint trade has been taking usual requirements. Prices for the different grades of zinc oxide underwent no change. First hands quote 8c. per lb. on the American process, lead free, and 7@7½c. on the leaded grades.

Consumption of cottonseed oil in September, according to an analysis of the August-September statistics, issued by the Bureau of Census on October 18, amounted to 169,000 bbl., which compares with 229,000 bbl. in September a year ago. The statistics on cottonseed and cottonseed products, covering the period beginning with August 1 and ending with September 30, for 1922 and 1923, follows:

	1922	1923
Seed received, ton	775,236	706,842
Seed crushed, ton	379,341	300,298
Crude oil m'f'd, lb.	110,918,253	84,522,018
Ref'd oil m'f'd, lb.	50,371,991	52,182,712
Cake and meal, ton	173,676	138,417
Stocks, Sept. 30:		
Seed, ton	408,443	419,330
Crude oil, lb.	55,961,034	34,457,208
Refined oil, lb.	54,863,380	41,581,932

Swedish Chemicals More Active

The chemical market is slightly livelier, says a dispatch from Stockholm. The prices of metallic color compounds are maintained, while zinc white has risen 2 or 3 oere per kilogram. Alkalis are firmer; potash, however, is very weak. Soda salts are unchanged or firmer, while among those that show no change are glauber salt, bisulphate and caustic soda. Dextrine has again dropped 2 oere per kilogram; chlorate potash has dropped 2 and salammoniac 2, whereas hartshorn salt has risen 4, Japan wax 8 and French turpentine 10 oere. Vegetable oils are essentially unchanged.

Imports at the Port of New York

October 11 to October 18

ACIDS—Citric—410 csk., Rotterdam, Order; 170 bbl., Rotterdam, Order. **Stearic**—3 cs., Rotterdam, Hummel & Robinson; 170 bg., Rotterdam, Lamont, Corliss & Co. **Tartaric**—219 csk., Rotterdam, Order.

ALBUMEN — 17 cs., Shanghai, French, Kreme Co.; 34 cs., Shanghai, Stein, Hall & Co.; 34 cs., Hankow, T. M. Duche & Sons; 34 cs., Hankow, A. Klipstein & Co.; 46 cs., Tientsin, Jardine, Matheson & Co.; 40 cs., Vancouver, Belgian Trading Co.

ALCOHOL — 94 csk. butylic, Bordeaux, Commercial Solvents Corp.; 60 dr. and 65 bbl. denatured, Arecibo, C. Esteva.

ALIZARINE—7 csk., Hamburg, Kuttroff, Pickhardt & Co.

ANTIMONY REGULUS — 250 cs., Hankow, Takata & Co.; 51 csk., Hull, E. Hill's Sons & Co.

AMMONIUM CARBONATE — 20 csk., Liverpool, Farmers Loan & Trust Co.

AMMONIUM MURIATE — 100 csk., Bristol, C. de P. Field Co.

ARSENIC—10 cs., Kobe, Suzuki & Co.; 96 cs., Kobe, Frazar & Co.; 250 cs., Yokohama, Chipman Chemical Engineering Co.; 50 csk. red, Antwerp, Roessler & Hasslacher Chemical Co.; 239 bbl., Tampico, American Smelting & Refining Co.; 88 bbl., Tampico, American Metal Co.; 137 cs. white, Vancouver, G. F. Taylor & Co.; 169 cs., Vancouver, Frazar & Co.

ASBESTOS—800 bg. crude, Beira, W. D. Crumpton & Co.

BARIUM CHLORIDE—52 csk., Antwerp, Am. Express Co.; 52 csk., Antwerp, E. M. Sergeant & Co.

BARYTES—300 bg., Bremen, New York Trust Co.

BRONZE POWDER—2 cs., Bremen, B. F. Drakenfeld & Co.; 18 cs., Bremen, Bank of the Manhattan Co.; 20 cs., Bremen, Gerstendorfer Bros.

CAMPHOR—100 cs., Hamburg, A. Ochse Co.; 45 bbl., Hamburg, Order.

CASEIN — 1,368 bx. and 20 bg., Buenos Aires, Order; 1,417 bg., Buenos Aires, Brown Bros. & Co.; 417 bg., Buenos Aires, Order; 835 bg., Buenos Aires, International Acceptance Bank; 750 bg., Buenos Aires, Kalbfleisch Corp.; 220 bg., St. Nazaire, E. B. Mumo.

CHALK—3,000 bg., Antwerp, Cooper & Cooper, Inc.; 1,000 bg., Antwerp, Reichard, Coulston, Inc.; 500 bg., Antwerp, L. A. Salmon & Bros.; 200 bg., Antwerp, Brown Bros. & Co.; 500 bg., Antwerp, Order; 425 csk. precipitated, Bristol, H. J. Baker & Co.; 1,000 bg., Antwerp, Bankers Trust Co.; 500 bg., Antwerp, Order; 500 bg., Antwerp, Reichard-Coulston, Inc.

CHEMICALS—39 bbl., Antwerp, Order; 200 cs., Havre, W. E. Miller; 50 cs., Havre, State Fwdg. & Shpg. Co.; 20 bbl., Bremen, Stanley Daggert, Inc.; 57 bbl., Hamburg, Chaplain & Bibbo, Inc.; 96 csk., Hamburg, Jungmann & Co.

COLORS—2 csk. aniline, Havre, Pennrich & Co.; 1 dr. do, Havre, Irving Bank-Col. Trust Co.; 36 pkg. do, Havre, Ciba Co.; 9 csk. do, Havre, Order; 9 csk., Hamburg, Bernard, Judae & Co.; 2 csk. aniline, Rotterdam, Textile Alliance, Inc.; 8 csk., Genoa, Ladenburg, Thalmann & Co.; 23 csk. aniline, Genoa, Order; 14 csk. aniline, Havre, Ciba Co.; 51 csk., Havre, Sandoz Chemical Works; 5 csk. aniline, Hamburg, Irving Bank-Col. Trust Co.; 10 cs., Hamburg, H. W. Robinson & Co.; 9 csk. aniline, Hamburg, Franklin Import & Export Co.; 11 pkg., Hamburg, A. Hurst & Co.

COPRA—125 bg., Morant Bay, Franklin Baker Co.

CREOSOTE—39 dr. coal-tar, Hull, Order; 2,211 tons, Antwerp, Order; 2,002 tons, Sunderland, Order.

DEXTRINE—25 bg. potato, Rotterdam, Stein, Hall & Co.

DYES—89 csk. aniline, Bombay, Order.

EGG YOLK—66 cs., Shanghai, French, Kreme Co.; 6 cs., Shanghai, Stein, Hall & Co.; 133 cs., Tientsin, Jardine, Matheson & Co.; 40 cs., Vancouver, Belgian Trading Co.

FERROCHROME—42 csk. Gothenburg, D. Heydemann & Co.

FULLERS EARTH — 250 bg., Bristol, L. A. Salmon & Bros; 400 bg., Hull, R. J. Waddel & Co.

FUSEL OIL—21 dr., Antwerp, Maas & Waldstein.

GALLNUTS — 300 cs., Hankow, Zinsser & Co.

GARNET ORE — 3,400 bg., Almeria, Order.

GRAPHITE AMORPHOUS — 11,175 bg., Fusan, Mitsui & Co.; 663 bg. ore, Halifax, M. Reinmann.

GLAUBER SALT — 440 csk., Hamburg. Ellis, Jackson & Co.; 500 bg. and 260 csk., Hamburg, E. Suter & Co.

GLYCERINE—89 dr. crude, Rio de Janeiro, Brazilian Merc. Co.

GUMS—235 bg. copal, Antwerp, Order; 205 bg. copal, Antwerp, W. Schall & Co.; 776 bg. copal, Antwerp, Order; 800 bskt copal, Macassar, Innes & Co.; 366 bskt., Macassar, France, Campbell & Darling; 371 bskt., Macassar, L. C. Gillespie & Son; 283 bskt., Macassar, Kidder, Peabody & Co.; 129 bskt. copal, Macassar, Importers Commission Co.; 513 bskt. copal, Macassar, Order; 50 cs. damar, Batavia, Canadian Bank of Commerce; 100 cs. do, Batavia, Catz Am. Co.; 100 cs. do, Batavia, W. H. Muller & Co.; 102 bg. tragacanth, Bombay, Goshens & Cunliffe; 11 cs. do, Bombay, Persian Produce Co.; 468 bg. karaya, Bombay, Order; 186 bg. tragacanth, Bombay, Order.

IRON OXIDE—55 csk., Liverpool, Reichard-Coulston, Inc.; 8 csk., Liverpool, Order; 233 bbl., Malaga, C. J. Osborn Co.; 77 csk., Liverpool, L. H. Butcher & Co.; 105 csk., Hull, J. L. Smith & Co.

LITHOPONE—220 csk., Antwerp, E. M. & F. Waldo; 100 csk., Rotterdam, Reichard-Coulston, Inc.; 780 csk., Rotterdam, Brown & Roese; 40 csk., Rotterdam, B. Moore & Co.

LOGWOOD EXTRACT—190 csk., Kingston, West India Chemical Works.

MYROBALANS — 11,693 pkt., Calcutta, National City Bank; 266 bg., Bombay, Hammond & Carpenter Corp.; 11,895 bg., Bombay, Order.

MAGNESIUM CHLORIDE — 1,536 dr., Hamburg, Innis, Speiden & Co.; 760 dr., Hamburg, Brown Bros. & Co.

MAGNESIUM CITRATE—200 cs., Genoa, East River National Bank; 100 cs., Genoa, F. N. Giavi, Inc.

MAGNESITE — 106 bbl., Rotterdam, Speiden, Whitfield Co.; 85 bbl., Rotterdam, Innis, Speiden & Co.

MANGANESE SULPHATE — 20 csk., Liverpool, Roessler & Hasslacher Chemical Co.

MINERAL WHITE — 1,200 bg., Hull, Hammill & Gillespie; 300 bg., Hull, C. B. Chrystal & Co.; 200 bg., Hull, Whittaker, Clarke & Daniels.

NAPHTHALENE — 1,865 bg., Antwerp, Order.

NICKEL SULPHATE—54 csk., Swansea, Order.

OLEO STEARINE—83 csk., Buenos Aires, Swift & Co.

OILS—Cod—100 csk., St. Johns, National Oil Products Co.; 150 csk., St. Johns, Franklin's Agencies. **China Wood** — 300 tons (bulk), Hankow, Balfour, Williamson & Co.; 300 bbl., Hankow, Mitsui & Co.; 300 bbl., Hankow, Mitsubishi Shoji Kaisha; 300 bbl., Hankow, Suzuki & Co.; 304 csk., Hankow, G. W. S. Paterson & Co. **Linseed**—356 bg. oxidized, Hull, Nairn Linoleum Co. **Olive Oil Foots** (sulphur oil)—500 bbl., Malaga, Order. **Palm Kernel**—400 bbl., Hull Order. **Palm**—78 csk., Antwerp, Order; 26 bbl., Liverpool, Order; 340 csk., Hamburg, African & Eastern Trading Co.; 160 csk., Hamburg, Order. **Rapeseed** — 30 csk., Havre, Cook & Swan Co.; 5 csk., Havre, Zinkeisen & Co.; 450 bbl., Hull, Balfour, Williamson & Co.; 150 bbl., Hull, Bank of America; 570 bbl., Hull, Order. **Sesame**—200 bbl., Rotterdam, Bank of America.

OIL SEEDS—Castor—28 bg., Port de Paix, Hachtmann & Co.; 37 bg., Port de Paix, Order; 22,575 bg., Bombay, Volkart Bros.; 1,402 bg., Cocmada, L. Dreyfus & Co.; 2,716 bg., Bombay, Order. **Linseed**—51,012 bg. and 2,345,087 kilos (bulk), Rosario, Order; 8,974 bg., Rosario, L. Dreyfus & Co.; 8,662 bg., Rosario, Order; 24,673 bg., Buenos Aires, Order.

OCHER — 57 csk., Marseilles, Heller & Merz; 50 bbl., Alicante, Hummel & Robinson Corp.

PARAPHENYLENDIAMINE — 11 cs., Hamburg, Franklin Import & Export Co.

PHOSPHATE — 1,000 bg., Antwerp, Order; 250 bg. super, Antwerp, Order.

PITCH—534 bbl., Hull, Order.

POTASSIUM SALTS—13,390 bg. muriate, Antwerp, Societe Comm. des Potasses d'Alsace; 18 csk., Bremen, Brown Bros. & Co.; 2,000 bg. muriate, Bremen, Potash Import Corp. of America; 100 dr. permanganate, Hamburg, Superfos Co.; 113 bbl. perchlorate, Swansea, Order; 75 dr. caustic, Hamburg, Peters, White & Co.; 226 csk. nitrate, Hamburg, Order; 20 bbl. salt, Bremen, Brown Bros. & Co.; 10 cs. perchlorate, Copenhagen, Order; 40 bbl. ferrocyanide, Hamburg, E. Suter & Co.; 1,000 bbl. chlorate, Hamburg, Irving Bank-Col. Trust Co.; 3,000 bg. manure salt, Hamburg, Potash Import. Corp. of America.

PLUMBAGO—779 bbl., Colombo, Order; 154 bbl., Colombo, Brown Bros. & Co.; 100 bbl., Colombo, N. Y. Trust Co.; 250 bbl., Colombo, Irving Bank-Col. Trust Co.

QUEBRACHO—22,320 bg., Buenos Aires, Tannin Corp.; 1,660 bg., Buenos Aires, Fourth Atlantic National Bank; 1,000 bg., Buenos Aires, First Nat'l Bank of Boston; 4,100 bg., Buenos Aires, Fourth Nat'l Bank, Boston; 11,961 bg., Buenos Aires, Order.

QUICKSILVER — 50 flasks, Alicante, Order.

ROCHELLE SALTS — 165 csk., Rotterdam, Order.

SHELLAC—100 bg., Hamburg, A. Helmrath; 65 bg. garnet, Hamburg, Irving Bank-Col. Trust Co.; 73 bg., Havre, Order; 40 bg., Hamburg, Kasebier-Chatfield Shellac Co.

SODIUM SALTS—117 dr. sulphite, Hamburg, C. S. Grant & Co.; 120 dr. sulphite, Bristol, R. F. Downing & Co.; 50 csk. nitrate, Hamburg, Order; 23 cs. prussiate, Liverpool, Order; 233 dr. sulphite, Hamburg, C. S. Grant & Co.

STARCH — 254 bg. potato, Rotterdam, Order.

STRONTIUM NITRATE—40 bbl., Hamburg, Order.

TANNING EXTRACT — 3 csk., Southampton, International Mercantile Marine Co.

TARTAR—311 bg., Rotterdam, C. Pfizer & Co.; 434 bg., Buenos Aires, Anglo-South American Bank.

ULTRAMARINE BLUE — 10 csk., Antwerp, J. Campbell; 30 bbl., Antwerp, Order.

VERMILION—3 csk., London, Pomeroy & Fischer Co.

WATTLE BARK — 3,863 bg., Durban, Proctor, Elison Co.; 6,741 bg., Durban, E. R. Legg & Co.; 465 bbl., Durban, Hammond Carpenter Corp.

WAXES—99 bg. bees, Antwerp, Order; 200 bg. montan, Bremen, Order.

WOOL GREASE—50 bbl., Hull, Hummel & Robinson; 100 bbl., Hull, Hunnell & Co.; 100 bbl., Hull, Marden, Wild Corp.

ZINC OXIDE—54 csk., Liverpool, L. H. Butcher & Co.

ZINC WHITE—20 csk., Havre, G. Euler.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0.25 – $0.25½
Acid, acetic, 28%, bbl.	100 lb.	3.38 – 3.50
Acetic, 56%, bbl.	100 lb.	6.75 – 7.00
Acetic, 80%, bbl.	100 lb.	9.58 – 9.83
Glacial, 99½%, bbl.	100 lb.	12.00 – 12.78
Acetic anhydride, 85%, dr.	lb.	.38 – ....
Boric, bbl.	lb.	.10 – ....
Citric, kegs	lb.	.49 – .50
Formic, 85%	lb.	.12 – .14
Gallic, tech.	lb.	.45 – .50
Hydrofluoric, 52%, carboys	lb.	.11 – .12
Lactic, 44%, tech., light, bbl.	lb.	.11½– .12
22% tech., light, bbl.	lb.	.05½– .06
Muriatic, 18° tanks	100 lb.	.90 – 1.00
Muriatic, 20°, tanks	100 lb.	1.00 – 1.10
Nitric, 36°, carboys	lb.	.04¼– .05
Nitric, 42°, carboys	lb.	.06 – .06¼
Oleum, 20%, tanks	ton	18.50 – 19.00
Oxalic, crystals, bbl.	lb.	.11½– .12
Phosphoric, 50% carboys	lb.	.07½– .08½
Pyrogallic, resublimed	lb.	1.50 – 1.60
Sulphuric, 60°, tanks	ton	9.00 – 11.00
Sulphuric, 60°, drums	ton	13.00 – 14.00
Sulphuric, 66°, tanks	ton	15.00 – 16.00
Sulphuric, 66° drums	ton	20.00 – 21.00
Tannic, U.S.P., bbl.	lb.	.65 – .70
Tannic, tech., bbl.	lb.	.45 – .50
Tartaric, imp., powd., bbl.	lb.	.30½– .31
Tartaric, domestic, bbl.	lb.	.34½– ....
Tungstic, per lb.	lb.	1.10 – 1.20
Alcohol, butyl, drums, f.o.b. works	lb.	.26 – .28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.78 – ....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.75 – ....
Alcohol, methyl (see Methanol)		
Alcohol, denatured, 190 proof		
No. 1, special bbl.	gal.	.48 – ....
No. 1, 190 proof, special, dr.	gal.	.42 – ....
No. 1, 188 proof, bbl.	gal.	.49 – ....
No. 1, 188 proof, dr.	gal.	.43 – ....
No. 5, 188 proof, bbl.	gal.	.47 – ....
No 5, 188 proof, dr.	gal.	.41 – ....
Alum, ammonia, lump, bbl.	lb.	.03½– .04
Potash, lump, bbl.	lb.	.03¾– .04¼
Chrome, lump, potash, bbl.	lb.	.06 – .07
Aluminum sulphate, com., bags	100 lb.	1.40 – 1.50
Iron free bags	lb.	2.40 – 2.50
Aqua ammonia, 26°, drums	lb.	.07 – .07½
Ammonia, anhydrous, cyl.	lb.	.30 – .30½
Ammonium carbonate, powd. casks, imported	lb.	.09½– .10
Ammonium carbonate, powd. domestic, bbl.	lb.	.13 – .14
Ammonium nitrate, tech., casks	lb.	.10 – .11
Amyl acetate tech., drums	gal.	4.50 – 4.75
Antimony Sulphuret, golden	lb.	.19 – .20
Arsenic, white, powd., bbl.	lb.	.13 – ....
Arsenic, red, powd., kegs	lb.	.15 – .15½
Barium carbonate, bbl.	ton	68.00 – 70.00
Barium chloride, bbl.	ton	82.00 – 88.00
Barium dioxide, drums	lb.	.18 – .18½
Barium nitrate, casks		.07½– .08
Blanc fixe, dry, bbl.	lb.	.04 – .04¼
Bleaching powder, f.o.b. wks., drums	100 lb.	1.25 – ....
Spot N. Y. drums	100 lb.	2.00 – 2.10
Borax, bbl.	lb.	.05½– .05½
Bromine, cases	lb.	.28 – .30
Calcium acetate, bags	100 lb.	4.00 – 4.05
Calcium arsenate, dr.	lb.	.15 – .20
Calcium carbide, drums	lb.	.05½– .05½
Calcium chloride, fused, dr. wks.	ton	21.00 – ....
Gran. drums works	ton	27.00 – ....
Calcium phosphate, mono, bbl.	lb.	.06½– .07
Camphor, cases	lb.	.85 – .86
Carbon bisulphide, drums	lb.	.07 – .07½
Carbon tetrachloride, drums	lb.	.09 – .09½
Chalk, precip.—domestic, light, bbl.	lb.	.04½– .04½
Domestic, heavy, bbl.	lb.	.03½– .03¾
Imported, light, bbl.	lb.	.04½– .05
Chlorine, liquid, tanks, wks.	lb.	.04 – .04½
Cylinders, 100 lb., wks.	lb.	.06 – .06½
Cylinders, 100 lb., spot	lb.	.08½– .09
Chloroform, tech., drums	lb.	.28 – .32
Cobalt, oxide, bbl.	lb.	2.10 – 2.25
Copperas, bulk, f.o.b. wks.	ton	21.00 – 24.00
Copper carbonate, bbl.	lb.	.18 – .19
Copper cyanide, drums	lb.	.47 – .50
Coppersulphate, dom., bbl.,	100 lb.	4.90 – 5.00
Imp. bbl.	100 lb.	4.40 – 4.50
Cream of tartar, bbl.	lb.	.23½– .25½
Epsom salt, dom., tech., bbl.	100 lb.	1.75 – 2.00
Epsom salt, imp., tech., bags	100 lb.	1.00 – ....
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.25 – 2.50
Ether, U.S.P., resale, dr.	lb.	.13 – .15
Ethyl acetate, 85%, drums	gal.	.80 – .81
Ethyl acetate, ether, 98% to 100%)	gal.	$0.95 – $1.00
Formaldehyde, 40%, bbl.	lb.	.11½– .12
Fullers earth—f.o.b. mines	ton	18.00 – 20.00
Fusel oil, ref., drums	gal.	.... – ....
Fusel oil, crude, drums	gal.	4.25 – ....
Glaubers salt, wks., bags	100 lb.	1.20 – 1.40
Glaubers salt, imp., bags	100 lb.	.90 – .95
Glycerine, c.p., drums extra	lb.	.17 – ....
Glycerine, dynamite, drums	lb.	.16½– ....
Glycerine, crude 80%, loose	lb.	.10½– .11
Iron oxide, red, casks	lb.	.12 – .18
Lead:		
White, basic carbonate, dry, casks	lb.	.09½– .09½
White, basic sulphate, casks	lb.	.08½– .09
White, in oil, kegs	lb.	.11½– .11½
Red, dry, casks	lb.	.10½– .10½
Red, in oil, kegs	lb.	.13 – .14½
Lead acetate, white crys., bbl.	lb.	.14 – .14½
Brown, broken, casks	lb.	.13 – .13½
Lead arsenate, powd., bbl.	lb.	.18 – .20
Lime-Hydrated, bg, wks.	ton	10.50 – 12.50
Bbl., wks.	ton	18.00 – 19.00
Lime, Lump, bbl. 280 lb.		3.63 – 3.65
Litharge, comm., casks	lb.	.10½– .10½
Lithophone, bags	lb.	.07 – .07½
in bbl.	lb.	.07½– .07½
Magnesium carb., tech., bags	lb.	.08 – .08½
Methanol, 95%, bbl.	gal.	.98 – 1.00
Methanol, 97%, bbl.	gal.	1.00 – 1.02
Methyl-acetone, t'ks.	gal.	1.15 – ....
Nickel salt, double, bbl.	lb.	.10½– ....
Nickel salts, single, bbl.	lb.	.11½– ....
Phosgene		.60 – .75
Phosphorus, red, cases	lb.	.... – ....
Phosphorus, yellow, cases	lb.	.35 – .40
Potassium bichromate, casks	lb.	.09½– .09¾
Potassium bromide, gran., bbl.	lb.	.19 – .20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½– .06½
Potassium chlorate, powd.	lb.	.07½– .08¼
Potassium cyanide, drums	lb.	.47 – .52
Potassium, first sorts, cask	lb.	.07¼ .07¾
Potassium hydroxide (caustic potash) drums	lb.	.07 – .07¼
Potassium iodide, cases	lb.	3.65 – 3.75
Potassium nitrate, bbl.	lb.	.07½– .09
Potassium permanganate, drums	lb.	.18 – .18½
Potassium prussiate, red, casks	lb.	.60 – .63
Potassium prussiate, yellow, casks	lb.	.28 – .29
Salammoniac, white, gran., casks, imported	lb.	.06½– .06½
Salammoniac, white, gran., bbl., domestic	lb.	.07½– .07¾
Gray, gran., casks	lb.	.08 – .09
Salsoda, bbl.	100 lb.	1.20 1.40
Salt cake (bulk)	ton	22.00 – 23.00
Soda ash, light, 58% flat, bulk, contract	100 lb.	1.33 – ....
bags, contract	100 lb.	1.45 – ....
Soda ash, dense, bulk, contract, basis 58%	100 lb.	1.42 – ....
bags, contract	100 lb.	1.51 – ....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.16 – ....
Soda, caustic, ground and flake, contracts, dr.	100 lb.	3.60 – 3.85
Soda, caustic, solid, 76% f. a. s. N. Y.	100 lb.	3.05 – 3.10
Sodium acetate, works, bags	lb.	.05½– .05¾
Sodium bicarbonate, bulk	100 lb.	1.75 – ....
330-lb. bbl.	100 lb.	2.00 – ....
Sodium bichromate, casks	lb.	.07½– .07¾
Sodium bisulphate (niter cake)	ton	6.00 – 7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½– .04½
Sodium chlorate, kegs	lb.	.06½– .07
Sodium chloride	long ton	12.00 – 13.00
Sodium cyanide, cases	lb.	.19 – .22½
Sodium fluoride, bbl.	lb.	$0.08½– $0.10½
Sodium hyposulphite, bbl.	lb.	.02½– .02¾
Sodium nitrite, casks	lb.	.07½– ....
Sodium peroxide, powd., cases	lb.	.28 – .30
Sodium phosphate, dibasic, bbl.	lb.	.03½– .04
Sodium prussiate, yel. drums	lb.	.13½– .14
Sodium salicylic, drums	lb.	.40 – .42
Sodium silicate (40°, drums)	100 lb.	.75 – 1.15
Sodium silicate (60°, drums)	100 lb.	1.75 – 2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 – .04
Sodium sulphite, crys., bbl.	lb.	.03½– .03½
Strontium nitrate, powd., bbl.	lb.	.11 – .12
Sulphur chloride, yel drums	lb.	.04½– .05
Sulphur, crude	ton	18.00 – 20.00
At mine, bulk	ton	16.00 – 18.00
Sulphur, flour, bag	100 lb.	2.25 – 2.35
Sulphur, roll, bag	100 lb.	2.00 – 2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 – .08½
Tin bichloride, bbl.	lb.	.12 – .12½
Tin oxide, bbl.	lb.	.47 – ....
Tin crystals, bbl.	lb.	.31½– .32
Zinc carbonate, bags	lb.	.14 – .14½
Zinc chloride, gran, bbl.	lb.	.06½– .06½
Zinc cyanide, drums	lb.	.37 – .38
Zinc oxide, , lead free, bbl.	lb.	.08 – .08½
5% lead sulphate, bags	lb.	.07½– ....
10 to 35 % lead sulphate, bags	lb.	.07 – ....
French, red seal, bags	lb.	.09½– ....
French, green seal, bags	lb.	.10½– ....
French, white seal, bbl.	lb.	.12 – ....
Zinc sulphate, bbl.	100 lb.	2.75 – 3.25

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 – $0.70
Alpha-naphthol, ref., bbl.	lb.	.65 – .80
Alpha-naphthylamine, bbl.	lb.	.35 – .36
Aniline oil, drums	lb.	.16 – .16½
Aniline salts, bbl.	lb.	.22 – .23
Anthracene, 80%, drums	lb.	.75 – .80
Anthracene, 80%, imp., drums, duty paid	lb.	.65 – .70
Anthraquinone, 25%, paste, drums	lb.	.80 – .85
Benzaldehyde U.S.P., carboys	lb.	1.50 – ....
f.f.c. drums	lb.	1.60 – ....
tech, drums	lb.	75 ....
Benzene, pure, water-white, tanks and drums	gal.	.23 – ....
Benzene, 90%, tanks & drums	gal.	.21 – ....
Benzidine base, bbl.	lb.	.80 – .85
Benzidine sulphate, bbl.	lb.	.75 – ....
Benzoic acid, U.S.P., kegs	lb.	.80 – 85
Benzoate of soda, U.S.P., bbl.	lb.	.65 – .70
Benzyl chloride, 95-97%, ref., drums	lb.	.45 – ....
Benzyl chloride, tech., drums	lb.	.30 – .35
Beta-naphthol, tech., bbl.	lb.	.21 – .22
Beta-naphthylamine, tech.	lb.	.75 – .80
Cresol, U.S.P., drums	lb.	.25 – .29
Ortho-cresol, drums	lb.	.28 – .32
Cresylic acid, 97%, works drums	gal.	.75 – .85
95-97%, drums, works	gal.	.70 – .75
Dichlorbenzene, drums	lb.	.06 – .08
Diethylaniline, drums	lb.	.50 – .60
Dimethylaniline, drums	lb.	.40 – .41
Dinitrobenzene, bbl.	lb.	.19 – .20
Dinitrochlorbenzene, bbl.	lb.	.21 – .22
Dinitronaphthalen, bbl.	lb.	.30 – .32
Dinitrophenol, bbl.	lb.	.35 – .40
Dinitrotoluen, bbl.	lb.	.20 – .22
Dip oil, 25%, drums	gal.	.25 – .30
Diphenylamine, bbl.	lb.	.50 – .52
H-acid, bbl.	lb.	.75 – .80
Meta-phenylenediamine, bbl.	lb.	1.00 – 1 05
Michlers ketone, bbl.	lb.	3.00 – 3.50
Monochlorbenzene, drums	lb.	.08 – .10
Monoethylaniline, drums	lb.	.95 – 1.10
Naphthalene, flake, bbl.	lb.	.06 – .06½
Naphthalene, balls, bbl.	lb.	.06½– .07
Naphthionate of soda, bbl.	lb.	.60 – .65
Naphthionic acid, crude, bbl.	lb.	.55 – .60
Nitrobenzene, drums	lb.	.09½– .10½
Nitro-naphthalene, bbl.	lb.	.30 – .35
Nitro-toluene, drums	lb.	.13½– .14½
N-W acid, bbl.	lb.	1.10 – 1.20
Ortho-amidophenol, kegs	lb.	2.30 – 2.35
Ortho-dichlorbenzene, drums	lb.	.15 – .17
Ortho-nitrophenol, bbl.	lb.	1.20 – 1.30
Ortho-nitrotoluene, drums	lb.	.10 – .12
Ortho-toluidine, bbl.	lb.	.18 – .20
Para-amiñophenol, base, kegs	lb.	1.30 – ....
Para-amiñophenol, HCl, kegs	lb.	1.55 – ....
Para-dichlorbenzene, bbl.	lb.	.17 – 20
Paranitroaniline, bbl.	lb.	.73 – .75
Para-nitrotoluene, bbl.	lb.	.60 – .65
Para-phenylenediamine, bbl.	lb.	1.45 – 1.50
Para-toluidine, bbl	lb.	.90 – .95
Phthalic anhydride, bbl.	lb.	.30 – .34
Phenol, U.S.P., dr.	lb.	.26 – .28
Picric acid, bbl.	lb.	.20 – .22
Pyridine, dom., drums	gal.	nominal
Pyridine, imp., drums	gal.	5.00 – 5 50
Resorcinol, tech., kegs	lb.	1.40 – 1 50

Resorcinol, pure, kegs	lb.	$2.15 –	$2.25
R-salt, bbl.	lb.	.55 –	.60
Salicylic acid, tech., bbl.	lb.	.32 –	.32
Salicylic acid, U.SP., bbl.	lb.	.35 –	....
Solvent naphtha, water-white, tanks	gal.	.27 –	....
Crude, tanks	gal.	.24 –	....
Sulphanilic acid, crude, bbl.	lb.	.18 –	.20
Thiocarbanilide, kegs	lb.	.35 –	.38
Tolidine, bbl	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars	gal.	.30 –	.32
Toluene, drums	gal.	.34 –	.36
Xylidine, drums	lb.	.50 –	....
Xylene, pure, drums	gal.	.50 –	.55
Xylene, com., drums	gal.	.34 –	....
Xylene, com., tanks	gal.	.29 –	....

Naval Stores

Rosin B-D, bbl.	280 lb.	$5.80 –	....
Rosin E-I, bbl.	280 lb.	5.80 –	....
Rosin K-N, bbl.	280 lb.	5.85 –	$6.10
Rosin W.G.-W.W., bbl.	280 lb.	6.50 –	7.00
Wood rosin bbl.	280 lb.	5.90 –	6.00
Turpentine, spirits of, bbl.	gal.	1.01 –	....
Wood, steam dist., bbl.	gal.	.93 –	....
Wood, dest. dist., bbl.	gal.	.75 –	....
Pine tar pitch, bbl.	200 lb.	5.50 –	....
Tar, kiln burned, bbl.	500 lb.	11.00 –	....
Retort tar, bbl.	500 lb.	11.00 –	....
Rosin oil, first run, bbl.	gal.	.45 –	....
Rosin oil, second run, bbl.	gal.	.47 –	....
Rosin oil, third run, bbl.	gal.	.50 –	....
Pine oil, steam dist.	gal.	.65 –	....
Pine oil, pure, dest. dist.	gal.	.60 –	....
Pine tar oil, ref.	gal.	.48 –	....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.32 –	.32½
Pine tar oil, double ref., bbl.	gal.	.... –	.75
Pine tar, ref., thin, bbl.	gal.	.... –	.25
Pinewood creosote, ref., bbl.	gal.	.... –	.52

Animal Oils and Fats

Degras, bbl.	lb.	$0.04 –	$0.04½
Grease, yellow, bbl.	lb.	.06½ –	.06¾
Lard oil, Extra No. 1, bbl.	gal.	.86 –	.88
Neatsfootoil 20 deg. bbl.	gal.	1.20 –	1.25
No. 1, bbl.	gal.	.92 –	.94
Oleo Stearine		.12½ –	....
Oleo oil, No. 1, bbl.	lb.	.14 –	.14¼
Red oil, distilled, d.p. bbl.	lb.	.09 –	....
Saponified, bbl.	lb.	.09 –	....
Tallow, extra, loose	lb.	.07½ –	....
Tallow oil, acidless, bbl.	gal.	.86½ –	.87

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.13 –	....
Castor oil, No. 1, bbl.	lb.	.13½ –	....
Chinawood oil, bbl.	lb.	.21 –	.21½
Coconut oil, Ceylon, bbl.	lb.	.09¾ –	.10
Ceylon, tanks, N.Y.	lb.	.08¼ –	.08½
Coconut oil, Cochin, bbl.	lb.	.10¼ –	.10¼
Corn oil, crude, bbl.	lb.	.11 –	....
Crude, tanks, (f.o.b. mill)	lb.	.09½ –	....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½ –	....
Summer yellow, bbl.	lb.	.12½ –	.13
Winter yellow, bbl.	lb.	.13½ –	.13¾
Linseed oil, raw, car lots, bbl.	gal.	.93 –	.95
Raw, tank cars (dom.)	gal.	.87 –	.88
Boiled, cars, bbl. (dom.)	gal.	.95 –	.96
Olive oil, denatured, bbl.	gal.	1.10 –	1.12
Sulphur, (foots) bbl.	lb.	.08¼ –	.08½
Palm, Lagos, casks	lb.	.07½ –	....
Niger casks	lb.	.07½ –	....
Palm kernel, bbl.	lb.	.08¼ –	.09
Peanut oil, crude, tanks (mill)	lb.	.13 –	....
Peanut oil, refined, bbl.	lb.	.14½ –	....
Perilla, bbl	lb.	.14½ –	.14¾
Rapeseed oil, refined, bbl.	gal.	.76 –	.76½
Rapeseed oil, blown, bbl.	gal.	.82 –	....
Sesame, bbl.	lb.	.12½ –	.12½
Soya bean (Manchurian), bbl.	lb.	.10½ –	....
Tank, f.o.b. Pacific coast	lb.	.09 –	....
Tank, (f.o.b. N.Y.)	lb.	.09½ –	....

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.66 –	$0.68
Menhaden, light pressed, bbl.	gal.	.62 –	....
White bleached, bbl.	gal.	.64 –	....
Blown, bbl.	gal.	.69 –	....
Crude, tanks (f.o.b. factory)	gal.	.47½ –	....
Whale No. 1 crude, tanks, coast	lb.	.... –	....
Winter, natural, bbl.	gal.	.76 –	.78
Winter, bleached, bbl.	gal.	.79 –	.80

Oil Cake and Meal

Coconut cake, bags	ton	$32.00 –	$33.00
Copra, sun dried, bags, (c.i.f.)	lb.	.05½ –	....
Sun dried Pacific coast	lb.	.04½ –	....
Cottonseed meal, f.o.b. mills	ton	39.00 –	....
Linseed cake, bags	ton	40.00 –	....
Linseed meal, bags	ton	48.00 –	....

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.45 –	$0.50
Albumen, egg, tech, kegs	lb.	.95 –	.97
Cochineal, bags	lb.	.32 –	.34
Cutch, Borneo, bales	lb.	.04 –	.04½
Cutch, Rangoon, bales	lb.	.15 –	.16
Dextrine, corn, bags	100 lb.	4.09 –	4.36
Dextrine gum, bags	100 lb.	4.44 –	4.71
Divi-divi, bags	ton	38.00 –	39.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Gambier com. cs	lb.	.08½ –	.09
Logwood, sticks	ton	25.00 –	26.00
Logwood, chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	80.00 –	85.00
Sumac, ground, bags	ton	$75.00 –	$80.00
Sumac, domestic, bags	ton	40.00 –	42.00
Starch, corn, bags	100 lb.	3.57 –	3.67
Tapioca flour, bags	lb.	.07 –	.07½

Extracts

Archil, conc., bbl.	lb.	$0.16½ –	$0.20
Chestnut, 25% tannin, tanks	lb.	.02 –	.03
Divi-divi, 25% tannin, bbl.	lb.	.04 –	.05
Fustic, crystals, bbl.	lb.	.20 –	.22
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.09 –	.09½
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, solid, drums	lb.	.24 –	.26
Hypernic, liquid, 51°, bbl.	lb.	.09½ –	.10½
Logwood, crys., bbl.	lb.	.14 –	.15
Logwood, liq., 51°, bbl.	lb.	.07½ –	.08
Quebracho, solid, 65% tannin, bbl.	lb.	.04½ –	.05
Sumac, dom., 51°, bbl.	lb.	.06½ –	.07½

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, spot	lb.	$0.14 –	$0.18
Lampblack, bbl.	lb.	.12 –	.48
Mineral, bulk	ton	35.00 –	45.00
Blues–Bronze, bbl.	lb.	.50 –	.55
Prussian, bbl.	lb.	.50 –	.55
Ultramarine, bbl.	lb.	.08 –	.35
Browns, Sienna, Ital., bbl.	lb.	.06 –	.14
Sienna, Domestic, bbl.	lb.	.03½ –	.04
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens–Chrome, C.P. Light, bbl.	lb.	.30 –	.32
Chrome, commercial, bbl.	lb.	.12 –	.12½
Paris, bulk	lb.	.28 –	.30
Reds Carmine No. 40, tins	lb.	4.50 –	4.70
Oxide red, casks	lb.	.10 –	.14
Para toner, kegs	lb.	1.00 –	1.10
Vermilion, English, bbl.	lb.	1.15 –	1.20
Yellow, Chrome, C.P. bbls.	lb.	.17½ –	.18
Ocher, French, casks	lb.	.02½ –	.03

Waxes

Bayberry, bbl.	lb.	$0.25 –	$0.26
Beeswax, crude, Afr. bg.	lb.	.22½ –	....
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candelilla, bags	lb.	.23½ –	.24
Carnauba, No. 1, bags	lb.	.36 –	.38
No. 2, North Country, bags	lb.	.23½ –	.24
No. 3, North Country, bags	lb.	.16½ –	.17
Japan, cases	lb.	.17 –	.17½
Montan, crude, bags	lb.	.05 –	....
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.04½ –	.04½
Crude, scale 124-126 m.p. bags	lb.	.02½ –	.03
Ref., 118-120 m.p., bags	lb.	.03½ –	....
Ref., 125 m.p., bags	lb.	.03½ –	....
Ref. 128-130 m.p., bags	lb.	.03½ –	....
Ref., 133-135 m.p., bags	lb.	.04½ –	.04½
Ref., 135-137 m.p., bags	lb.	.05½ –	.05½
Stearic acid, sgle pressed, bags	lb.	.12½ –	.12½
Double pressed, bags	lb.	.13 –	.13½
Triple pressed, bags	lb.	.14½ –	.14½

Fertilizers

Ammonium sulphate, bulk f.o.b. works	100 lb.	$3.20 –	$3.25
F.a.s. double bags	100 lb.	3.40 –	3.50
Blood, dried, bulk	unit	4.40 –	4.60
Bone, raw, 3 and 50, ground	ton	28.00 –	30.00
Fish scrap, dom., dried, wks.	unit	.... –	....
Nitrate of soda, bags	100 lb.	2.40 –	2.52½
Tankage, high grade, f.o.b. Chicago	unit	3.25 –	3.35
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	4.00 –	4.50
Tennessee, 78-80%	ton	7.75 –	8.00
Potassium muriate, 80%, bags	ton	34.55 –	....
Potassium sulphate, bags basis 90%	ton	43.67 –	....
Double manure salt	ton	25.72 –	....
Kainit	ton	7.22 –	....

Crude Rubber

Para—Upriver fine	lb.	$0.22½ –	....
Upriver coarse	lb.	.19 –	....
Upriver caucho ball	lb.	.20 –	....
Plantation—First latex crepe	lb.	.26½ –	....
Ribbed smoked sheets	lb.	.26½ –	....
Brown crepe, thin, clean	lb.	.25½ –	....
Amber crepe No. 1	lb.	.26 –	....

Gums

Copal, Congo, amber, bags	lb.	$0.11 –	$0.18
East Indian, bold, bags	lb.	.22½ –	.23
Manila, pale, bags	lb.	.20 –	.20½
Pontinak, No. 1 bags	lb.	.20 –	.20½
Damar, Batavia, cases	lb.	.25 –	.25½
Singapore, No. 1, cases	lb.	.32 –	.33
Singapore, No. 2, cases	lb.	.22½ –	.23
Kauri, No. 1, cases	lb	.66 –	.68
Ordinary chips, cases	lb.	.21 –	.23
Manjak, Barbados, bags	lb.	.09 –	.09½

Shellac

Shellac, orange fine, bags	lb.	$0.66 –	$0.67
Orange superfine, bags	lb.	.68 –	.69
A. C. garnet, bags	lb.	.65 –	....
Bleached, bonedry	lb.	.74 –	.75
Bleached, fresh	lb	.62 –	.63
T. N., bags	lb.	.62 –	.63

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh ton	$375.00 –	$500.00
Asbestos, shingle, f.o.b., Quebec	sh. ton	$55.00 –	$60.00
Asbestos, cement, f.o.b., Quebec	sh ton	20.00 –	25.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	16.00 –	20.00
Barytes, grd., off-color, f.o.b. mills bulk	net ton	13.00 –	15.00
Barytes, floated, f.o.b. St. Louis, bbl.	net ton	28.00 –	....
Barytes, crude f.o.b. mines, bulk	net ton	8.00 –	10.00
Casein, bbl., tech.	lb.	.14½ –	.15½
China clay (kaolin) crude, f.o.b. Ga.	net ton	6.00 –	8.00
Washed, f.o.b. Ga.	net ton	8.00 –	9.00
Powd., f.o.b. Ga.	net ton	14.00 –	20.00
Crude f.o.b. Va.	net ton	6.00 –	8.00
Ground, f.o.b. Va.	net ton	13.00 –	19.00
Imp., lump, bulk	net ton	15.00 –	20.00
Imp., powd.	net ton	45.00 –	50.00
Feldspar, No. 1 pottery	long ton	7.50 –	....
No. 2 pottery	long ton	6.00 –	....
No. 1 soap	long ton	8.50 –	....
No. 1 Canadian, f.o.b. mill	long ton	18.00 –	20.00
Graphite, Ceylon, lump, first quality, bbl.	lb.	.06 –	.06½
Ceylon, chip, bbl.	lb.	.04½ –	.05
High grade amorphous crude	ton	15.00 –	30.00
Gum arabic, amber, sorts, bags	lb.	.14 –	.16
Gum tragacanth, sorts, bags	lb.	.50 –	.55
No. 1, bags	lb.	1.45 –	1.50
Kieselguhr, f.o.b. Cal.	ton	40.00 –	42.00
F.o.b. N. Y.	ton	50.00 –	55.00
Magnesite, crude, f.o.b. Cal.	ton	14.00 –	15.00
Pumice stone, imp., casks	lb.	.03 –	.05½
Dom., lump, bbl.	lb.	.05 –	.05½
Dom., ground, bbl.	lb.	.05½ –	.06
Silica, glass sand, f.o.b. Ind.	ton	2.00 –	2.50
Silica, sand blast, f.o.b. Ind.	ton	2.50	5.00
Silica, amorphous, 250-mesh, f.o.b. Ill.	ton	17.00 –	17.50
Silica, glass sand, f.o.b. Ill.	ton	1.50 –	3.00
Soapstone, coarse, f.o.b. Vt., bags	ton	7.00 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra	ton	6.00 –	8.00
Talc, 200 mesh, f.o.b. Ga., bags	ton	7.00 –	9.00
Talc, 325 mesh, f.o.b. New York, bags	ton	14.75 –	15.25

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.50 –	2.75
Corning	bbl.	1.45 –	....
Cabell	bbl.	1.35 –	....
Somerset	bbl.	1.25 –	....
Illinois	bbl.	1.47 –	....
Indiana	bbl.	1.48 –	....
Kansas and Oklahoma, 28 deg.	bbl.	.50 –	....
California, 35 deg. and up	bbl.	.76 –	....

Gasoline, Etc.

Motor gasoline, steel bbls.	gal.	$0.16½ –	....
Naphtha, V. M. & P. deod, steel bbls.	gal	.16½ –	....
Kerosene, ref. tank wagon	gal.	.14 –	....
Bulk, W.W. delivered, N.Y.	gal.	.06 –	....
Lubricating oils:			
Cylinder, Penn., dark	gal.	.22½ –	....
Bloomless, 30@31 grav.	gal.	.17½ –	....
Paraffin, pale	gal.	.16 –	.17
Spindle, 200, pale	gal.	.20 –	.20½
Petrolatum, amber, bbls.	lb.	.03½ –	.04
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–145
Chrome brick, f.o.b. Eastern shipping points	ton	50–52
Chrome cement, 40-50% Cr_2O_3	ton	25–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	45–48
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	38–42
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	53–55
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	53–54
F.o.b. Mt. Union, Pa.	1,000	45–47
Silicon carbide refract. brick, 9-in.	1,000	1,100.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y.	ton	$200.00 –	$225.00
Ferrochromium, per lb. of Cr, 1-2% C	lb.	.28 –	.30
4-6% C	lb.	.12 –	....
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	110.00 –	....
Spiegeleisen, 19-21% Mn	gr. ton	45.00 –	47.00
Ferromolybdenum, 50-60% Mo, per lb Mo	lb.	2.00 –	2.50
Ferrosilicon, 10-12%	gr. ton	43.00 –	50.00
50%	gr. ton	85.00 –	....

Ferrotungsten, 70–80%, per lb. of W	lb.	$0.88 @ $0.90
Ferro-uranium, 35-50% of U. per lb. of U	lb.	4.50 – ....
Ferrovanadium, 30-40%, per lb. of V	lb.	3.50 – 4.50

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$5.50 – $8.75
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 – 23.00
C.i.f. Atlantic seaboard	ton	21.00 – 25.00
Coke, fdry., f.o.b. ovens	ton	5.00 – 5.50
Coke, furnace, f.o.b. ovens	ton	3.75 – 4.00
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50 –.....
Ilmenite, 52% TiO_2	lb.	.01½– .01¾
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.40 –.....
Manganese ore, chemical (MnO_2)	ton	75.00 – 80.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.75 –.....
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 – .08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 –.....
Rutile, 95% TiO_2	lb.	.12 –.....
Tungsten, scheelite, 60% WO_3 and over	unit	9.50 – 10.00
Tungsten, wolframite, 60% WO_3	unit	8.75 – 9.00
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 – 3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	2.25 – 2.50
Vanadium pentoxide, 99%	lb.	12.00 – 14.00
Vanadium ore, per lb. V_2O_5	lb.	.75 – 1.00
Zircon	ton	50.00 –.....

Non-Ferrous Materials

	Cents per Lb.
Copper, electrolytic	12¾
Aluminum, 98 to 99%	25–27
Antimony, wholesale, Chinese and Japanese	7¼– 7¾
Nickel, virgin metal, 99%	27–32
Monel metal, shot and blocks	32.00
Monel metal, ingots	38.00
Monel metal, sheet bars	45.00
Tin, 5-ton lots, Straits	41.75
Lead, New York, spot	6.85
Lead, E. St. Louis, spot	6.60
Zinc, spot, New York	6.75
Zinc, spot, E. St. Louis	6.40

Other Metals

Silver (commercial)	oz.	$0.63¼
Cadmium	lb.	.85
Bismuth (500 lb. lots)	lb.	2.55
Cobalt	lb.	3.00-3.25
Magnesium, ingots, 99%	lb.	1.25–....
Platinum	oz.	116.00
Iridium	oz.	275.00@300.00
Palladium	oz.	80.00
Mercury	75 lb.	61.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	19.25
Copper bottoms	29.75
Copper rods	19 75
High brass wire	18.00
High brass rods	16.25
Low brass wire	20.25
Low brass rods	20.50
Brazed brass tubing	23.50
Brazed bronze tubing	27.00
Seamless copper tubing	25.50
Seamless high brass tubing	24.00

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible	8.75@ 9.00
Copper, heavy and wire	11.00@ 11.25
Copper, light and bottoms	9.00@ 9.25
Lead, heavy	5.50@ 5.62½
Lead, tea	3.50@ 3.75
Brass, heavy	6.25@ 6.50
Brass, light	5.25@ 5.50
No. 1 yellow brass turnings	5.75@ 6.00
Zinc scrap	3.75@ 4.00

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.54	$3.54
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Sft steel bands	4.39	4.39
Plates, ¼ to 1 in. thick	3 64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Arizona

OATMAN—The Oatman United Mining Co. has completed plans and will commence the construction of a new gold cyanide mill, designed for a capacity of about 25 tons per day. The plant will operate under a new process of electro-cyanide type. J. K. Turner is consulting engineer.

California

MILLBRAE—The West Coast Porcelain Co., manufacturer of vitreous porcelain products, has plans for enlargements in its plant, to include the erection of a number of new buildings with additional equipment, estimated to cost in excess of $400,000. A large increase in present output will be provided. Henry Weiss is president.

POMONA—The Pomona Tile Mfg. Co., recently formed with a capital of $100,000, has awarded a general contract to H. M. Hanawalt, La Verne, Calif., for the construction of the initial unit of its proposed new plant on local site lately acquired. It will be 1-story, 100x106 ft., and equipped for the manufacture of tile products. Judson F. Clarke, Pasadena, Calif., is president and treasurer.

ALHAMBRA—The Gold Seal Refining Co., formerly known as the Wadolene Refining Corp., has plans for the construction of a new compounding plant on local site, for the production of lubricating oils, greases, etc. The initial unit will be supplemented by other buildings at a later date.

LOS ANGELES—The Southern California Gas Co. is planning for extensions and improvements in its artificial gas plants, to include the construction of a new holder, with pressure plant, etc., for a capacity of 10,000,000 cu.ft.

Colorado

LOVELAND—The City Council is completing plans for the installation of a new filtration plant at the municipal waterworks, estimated to cost $50,000.

Georgia

RAYMOND—David H. Kirkland is organizing a company to construct and operate a local plant for the manufacture of firebrick, tile and kindred products. A site has been selected. Inquiries will soon be made for necessary equipment. The initial works are expected to cost close to $50,000.

Illinois

CHICAGO—The United Cork Co., 110 South Dearborn St., E. J. Ward in charge, is taking bids for the erection of a new 1-story building, 72x125 ft., on Eddy St., and will break ground at an early date. Henschein & McLaron, 1637 Prairie Ave., are architects.

Indiana

COLUMBUS—The Indiana Oil Refining Co. has tentative plans under consideration for extensions and improvements in its local plant, and purposes to raise a fund of about $125,000 for the work. The Graver Corp., East Chicago, Ind., is interested in the project.

Kentucky

OWENSBORO—The Owensboro Clay Products Co. has commenced work on its proposed new local plant, to consist of a number of buildings, estimated to cost approximately $100,000, including equipment. John A. Bolger heads the company.

Louisiana

MONROE—A. H. Sweet is perfecting plans for the organization of a company to construct and operate a local plant for the manufacture of special glass containers and devices. A site of more that 4 acres of land has been acquired and detailed plans for the initial unit are being completed.

HOUMA—The Southdown Sugar Factory, Southdown, Terrebonne Parish, near Houma, has tentative plans under consideration for the rebuilding of the portion of its 4-story plant, recently destroyed by fire with loss estimated at $50,000, including machinery. The plant has been employed for the production of granulated sugar.

Maryland

BALTIMORE—The Porcelain Enamel & Mfg. Co. has awarded a contract to the P. C. Street Engineering Co., 406 St. Paul St., for the erection of a main manufacturing building at its new plant site, to be constructed in connection with other buildings at the same location, now in progress. It will be 1- and 2-story, 100x500 ft., estimated to cost about $225,000, including machinery. R. C. Sandlass, Main Ave., is architect.

Massachusetts

BOSTON—The Hungerford Brass & Copper Co., 296 Franklin St., has construction in progress on a new 2-story building, 80x240 ft., on D St., South Boston, estimated to cost about $120,000. William E. Austin, 46 West 24th St., New York, is architect.

Michigan

GREENVILLE—The Wolverine Shoe & Tanning Co., Grand Rapids, with works at Rockford, Mich., will construct a new 2-story plant on North Lafayette St., 50x100 ft. It is expected to provide facilities for the employment of close to 100 operatives.

MARINE CITY—James Davidson, Bay City, Mich., operating the Mt. Clemens Sugar Co., Mt. Clemens, Mich., and similar properties, has purchased the former local mill of the Independent Sugar Co., heretofore held by the Detroit Trust Co. The plant has been idle for the past 2 years. The new owner is said to be arranging to use the property at an early date.

JACKSON—The Jaxon Steel Products Co. has commenced the erection of a new addition to its plant on South Horton St., estimated to cost $32,000.

Minnesota

ST. PAUL—The C. & C. Glass Co., 727 South 4th St., has authorized plans for the construction of a new 2-story plant at Hampden and Bradford Aves., to be 60x200 ft., estimated to cost approximately $80,000, including equipment. Albin Carlson is one of the heads of the company.

Montana

PHILIPSBURG—The Phosphate Products Co. has plans for the extensive development of local phosphate lands, and purposes to provide equipment and facilities for an annual output of close to 50,000 tons. H. G. Wells is manager.

New Jersey

TRENTON—Fire, Sept. 6, destroyed one of the buildings at the plant of the Agasote Millboard Co., Fernwood St., manufacturer of paper stockboard, with loss estimated at $25,000.

PASSAIC—The Manhattan Rubber Co., 120 Broadway, New York, manufacturer of mechanical rubber products, will commence the construction of a 1-story addition to its plant, 60x220 ft., for considerable increase in capacity. Contract for the building recently has been let to the Austin Co., 217 Broadway, New York. It is estimated to cost $65,000. A. F. Townsend is president.

TRENTON—The Maryland Steel Rolling Co. has commenced extensions and improvements at its local mill at 599 Ingraham Ave., to include the installation of additional equipment for the production of cold-rolled stamping steel, etc. A new type of box strap annealing furnaces will be installed to replace present lead annealing units, as well as automatic power reels, motor-driven mills and auxiliary equipment.

BELLEVILLE—William Frebel, 505 Stuyvesant Ave., Irvington, N. J., has awarded a general contract to Cooper & Green, 182 Lincoln Place, Irvington, for the erection of a new tanning plant at 499 Main St., Belleville. It will be three-story, 42x100 ft., estimated to cost $32,000.

North Carolina

DUNN—The Merchants Fertilizer & Phosphate Co., Charleston, S. C., has acquired the local fertilizer plant of the Seminole Co. Plans are under way for extensions and improvements, including remodeling of the existing buildings. It is expected to place the works in active production at an early date.

MURPHY—The Murphy Coal & Iron Co., recently organized with a capital of $50,000, is planning for the development of iron ore properties in this section, and will install complete equipment for this purpose, including crushers, ore washers, drilling machinery and auxiliary apparatus. Scott Litton is president, and P. H. Smith secretary. L. L. Heaton, general manager, Murphy, is in charge.

Ohio

TOLEDO—The Libbey-Owens Sheet Glass Co., Nicholas Bldg., has tentative plans under way for the construction of a new plant for the production of plate glass, estimated to cost close to $800,000, with machinery. The Devore Co., 808 Nicholas Bldg., is architect and engineer. E. D. Libbey is president.

ST. CLAIRSVILLE—The American Zinc & Chemical Co. is planning for the erection of an addition to its local sulphuric acid plant, to be used for the production of lithopone. It is estimated to cost in excess of $250,000, with machinery, and will be designed to give employment to about 200 operatives.

GARRETTSVILLE—The Polson Rubber Co., Cleveland, has acquired the local plant of the McWade Tire & Rubber Co., and plans to occupy the structure at an early date. It is purposed to establish the main company works at this location.

CLEVELAND—The Cleveland Tanning Co., Dennison Ave., is taking bids for the construction of a new addition, 40x40 ft. G. S. Roder, 612 Century Bldg., is architect.

Oklahoma

TULSA—The Prest-O-Lite Co., 30 East 42d St., New York, manufacturer of acetylene products, has completed plans for the construction of a new local branch plant, and will commence work at an early date.

Pennsylvania

BUTLER—The Capitol Paint & Varnish Co., Canton, O., has acquired the local plant of the Independent Brewing Co., consisting of a number of buildings, and plans for the establishment of a new branch works at this location. The structures will be remodeled and improved, and equipment installed. It is purposed to commence operations at an early date.

DANVILLE—The Danville Art Bronze & Iron Works, Inc., has constructed in progress on a new foundry, and plans to commence the installation of equipment in the near future.

PHILADELPHIA—The Certain-Teed Products Co., 100 East 42d St., New York, manufacturer of roofing, paints, varnishes, etc., has awarded a contract to Elbert S. Tillotson, Swarthmore, Pa., for the erection of a new plant at 3631 North 2nd St., estimated to cost $25,000.

South Carolina

DENMARK—The Denmark Fertilizer Mfg. Co. is planning for the construction of a new local plant for the manufacture of a line of commercial fertilizers. J. D. Prothro, Aiken, S. C., is one of the heads of the company.

CHARLESTON—The Paul Rubber Co., Salisbury, N. C., is planning for the establishment of a branch plant for the manufacture of automobile tires and kindred rubber products.

Texas

MAGNOLIA PARK (HOUSTON)—The Common Council has arranged a bond issue of $300,000, the proceeds to be used for the construction of an artificial gas plant, using crude oil as fuel. A site has been selected at Sunset St. and Ave. Q. Jones & Lowe, San Francisco, Cal., are engineers.

HOUSTON—The Gulf Concrete Pipe Co. has tentative plans for the construction of a new plant on the Harrisburg Boulevard for the manufacture of concrete pipe and cement products, estimated to cost about $28,000. N. A. Eppes is president.

SAN ANTONIO—The Grayburg Refinery, Roosevelt Ave., is planning for the installation of additional equipment at its plant, including stills, tanks and auxiliary apparatus.

Washington

TACOMA—The Tacoma Brick & Tile Co. has construction in progress on a new local plant, near the Tacoma smelter, to be used primarily for the production of tile products. The equipment installation is estimated to cost in excess of $50,000. It is purposed to have the works ready for operation early in the coming year. R. H. Bertke is one of the heads of the company.

West Virginia

HUNTINGTON—The Guyan Color & Chemical Co., recently organized, will take over and operate the local plant of the Lamie Chemical Co., and plans for expansion in the near future. The new company is capitalized at $50,000. R. D. Lamie is president.

PARSONS—Following the sale and reorganization of the Parsons Pulp & Paper Co., arrangements are being perfected for the early resumption of operations at the local mill. Repairs and improvements will be made to the machinery. It is expected to develop maximum output. J. B. Wilt is superintendent, in charge.

Wyoming

TORRINGTON—The Holly Sugar Corp., Colorado Springs, Colo., is reported to be considering plans for a new mill in this district. A local site is under consideration.

New Companies

UNION OIL MILL, INC., Monroe, La.; cottonseed oil products; $150,000. Incorporators: S. G. Sample and C. W. Wallace, both of Monroe.

STANDARD FIBER PRODUCTS Co., Somerville, Mass.; fiber specialties; $50,000. Clarence T. Hansen, 143 Elm St., is president and treasurer.

BEACON TIE & RUBBER CORP., New York, N. Y.; tires and other rubber products; $2,500,000. Incorporators: H. W. Paprocki and F. C. Taylor. Representative: F. J. Knorr, attorney, Albany, N. Y.

BROWN OIL Co., Jersey City, N. J.; refined oils; $125,000. Incorporators: Harry Feldman and Max Brown, 14 Halladay St., Jersey City. The last noted is representative.

DAN-D-REM, INC., 800 North Clark St., Chicago, Ill.; chemicals and chemical byproducts; nominal capital $5,000. Incorporators: Earl Hann, Edward Goodreau and E. W. Gould.

DAYGLOS VARNISH Co., Dover, Del.; varnishes, paints, etc.; $150,000. Representative: United States Corporation Co., Dover, Del.

FREMONT OIL Co., Denver, Colo.; refined petroleum products; $100,000. Incorporators: Fay C. Roberts, W. E. Johnson and George K. Thomas, 630 First National Bank Bldg., Denver. The last noted is representative.

JERSEY RUBBER Co., Rutherford, N. J.; rubber products; $25,000. Incorporators: Thomas A. and A. E. Farrell, and William H. J. Ely, 10 Ames St., Rutherford. The last noted is representative.

GOLDEN ROD CHEMICAL Co., New York, N. Y.; disinfectants and other chemical products; $10,000. Incorporators: H. A. and M. A. Shuman, and D. Slatin. Representative: Leo Schafran, 51 Chambers St., New York.

FLEXIBLE FIBER PRODUCTS Co., Rockford, Ill.; fiber specialties; nominal capital $4,000. Incorporators: A. N. Valentine, C. A. Peterson and J. E. Nroadie, 657 Race St., Rockford.

ASSOCIATED REFINING Co., St. Petersburg, Fla.; refined oils; capital not stated. James R. Bussey, president, and Charles J. Maurer, secretary, both of St. Petersburg.

FRANKLIN POTTERY, INC., Philadelphia, Pa.; pottery and ceramics; $51,200. Representative: Corporation Guarantee & Trust Co., Land Title Bldg., Philadelphia.

TUCKER RUBBER CORP., Buffalo, N. Y.; rubber products; $300,000. Incorporators: J. T. Warder and J. Waymer, Jr. Representative: W. F. Timme, 350 Madison Ave., New York.

ECLIPSE CHEMICAL Co., Wilmington, Del.; chemicals and chemical byproducts; $100,000. Representative: Victor Barsky, Wilmington.

EASTLAND COUNTY PETROLEUM Co., Cisco, Tex.; refined petroleum products; $50,000. Incorporators: H. J. Wood and J. J. Patterson, both of Cisco.

AUTOMOTIVE JAPANNING Co., St. Louis, Mo.; metal japanning; $15,000. Incorporators: H. F. and Valentine C. Kloepper, both of St. Louis.

NEWARK LEATHER Co., Newark, N. J.; leather products; $100,000. Incorporators: J. Gordon Gant and Benjamin Newman, 790 Broad St., Newark. The last noted is representative.

STANDARD COLOR Co., INC., Boston, Mass.; colors, dyes, etc.; $10,000. Louis M. Bowers, Cambridge, Mass., is president and treasurer.

SWOYER BRASS & COPPER Co., New York, N. Y.; brass, bronze, copper and other metals; $30,000. Incorporators: E. J. Johnson, A. F. Behan and F. H. Baldy. Representative: Johnson & Galbton, 49 Wall St., New York.

BIG FOUR REFINING Co., Los Angeles, Calif.; refined petroleum products; $200,000. Incorporators: W. A. Denny, J. D. Wrather and J. R. Wrather, all of Long Beach, Calif. Representative: Colonial Charter Co., Ford Bldg., Wilmington, Del.

BRUCE BOLL WEEVIL EXTERMINATOR Co., Columbia, S. C.; chemical compounds; $50,000. A. H. Kohn is president, and W. D. Dickey, secretary and treasurer, both of Columbia.

ALJAK PAINT CORP., New York, N. Y.; paints, varnishes, oils, etc.; $25,000. Incorporators: W. E. Vogel, J. H. Schmidt and M. H. Donlon. Representative: Daniel Burke, 40 Exchange Place, New York.

RIVERSIDE CEMENT & ASBESTOS MFG. Co., Wilmington, Del.; asbestos shingles and kindred products; $3,000,000. Representative: Corporation Trust Co. of America, du Pont Bldg., Wilmington.

THE MADSENELL CORPORATION has recently been organized under the laws of the State of New York with offices, laboratory and demonstration rooms at 33 East 17th St., Manhattan. Capital is $100,000 8 per cent preferred stock and 1,000 shares common of no par value. The officers are F. V. Knauss, president; Charles P. Madsen, vice-president and consultant, and U. A. Garret, secretary, treasurer and general manager.

Industrial Notes

THE KENNEDY-VAN SAUN MFG. & ENG. CORP., New York, announces the appointment of E. S. Tompkins to the sales and engineering department, with headquarters at 50 Church St. Mr. Tompkins was formerly Eastern sales manager of the Mine & Smelter Supply Co.

THE LINK-BELT Co., Chicago, announces the appointment of Richard W. Yerkes, formerly general manager of the Link-Belt Co.'s Philadelphia plant, as treasurer of the company, succeeding B. A. Gayman. Mr. Gayman was selected to head the newly acquired Meese & Gottfried Co. of San Francisco. The new company will operate under the name Link-Belt Meese & Gottfried Co., San Francisco. Mr. Yerkes will be located at the Chicago office of the company.

THE DETROIT STOKER Co. announces the appointment of E. L. Beckwith as district manager in charge of the company's Chicago office at 230 South Clark St.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

PAINTS AND VARNISHES. Johannesburg, South Africa. Purchase.—7947.

PITCH, mineral, free from phenol, and pitch or rosin, wood. Bischweiler, France. Purchase.—7949.

ASBESTOS PRODUCTS. Calcutta, India. Purchase and agency.—7862.

LUBRICATING OILS AND GREASES. Calcutta, India. Purchase and agency.—7962.

LAUNDRY SOAPS. Arecibo, Porto Rico. Agency.—7956.

COTTONSEED OIL AND TALLOW. Mexico City, Mexico. Agency.—7953.